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Welcome to

Strata Live 3D CX 2

1.1 Introduction to Live 3D CX 2

Strata Live 3D CX 2™ is a powerful real-time 3D application for creating content for the web and PDF. Live 3D creates high quality content perfect for marketing projects, online catalogs, training manuals, design presentations and more (also known as Product Tours). This User Guide is designed to help get you on your feet as quickly as possible.

Live 3D is designed to work with 3D content from a variety of sources such as CAD data and design files from other 3D applications. Live 3D is not a modeling application so you'll need access to model files from another source or (ideally) you'll want to have a full modeling companion application such as **Strata Design 3D CX™**.

Once the model data is imported into Live 3D you can add animation, adjust surface materials, set compression levels, make decisions about the interactive interface and more. The projects created in Live 3D CX are saved as **Master Models™**, in **XMM** format. This format is open and directly editable, which allows complex changes to be made to the model, giving you the power to go beyond the features directly editable in Live 3D.

Of course, the perfect companion products for Live 3D are **Strata Design 3D CX 6™** and **Strata Foto 3D CX 2™**. Strata Design 3D is a powerful modeling, texturing and animation application. Foto 3D CX provides the ability to create 3D models directly from photographs. It is ideal for creating interactive 3D online product catalogs, for example. Whatever your companion products of choice are, Live 3D will add interactivity to your 3D world.

StrataLive3D Access

StrataLive3D.com is a revolutionary web service that is part of the Strata Live 3D CX 2 toolset. StrataLive3D.com makes it easy to place 3D graphics on the web; as models in the StrataLive3D.com public gallery, on private gallery pages

for your clients, and as embedded objects for blogs and websites, much like YouTube videos.

The Strata Live 3D hosting service comes free with purchase of your Live 3D CX 2 license. Using the **Direct to Web command** in the Export menu, you can easily upload your Live 3D models to StrataLive3d.com.

For complete information, see **Using StrataLive3D.com** in the next section of this chapter.

Java™ Power

Strata Live 3D CX 2 is written in the Java programming language. In addition to the Live 3D authoring application, the players themselves are Java "**applets**" or JAR files (Java Archives). This commitment to Java provides a tremendous amount of power to the entire Live 3D system. Both the application and player are platform independent. When people want to view the content you've created using Live 3D there is no plug-in required. This means that web content, for example, can be opened by virtually any visitor using any browser.

One of the side effects of this commitment to Java is that Live 3D uses **Java standards** when it comes to application look and feel. You may notice differences in how windows and palettes are displayed and managed. Though this may be non-standard for the operating system you use, it means that the content will be fully independent of current and future platform restrictions.

More About the Master Model Format and XML

Product Tours are a collection of elements, but the heart of the project is the Master Model file format. This format includes a rich set of information about the 3D file. This file format can be edited in a text editor or directly from within the Live 3D interface. The core of the Master Model is based on the XML format standard. This standard opens up many possibilities for power users to who want to create very complex projects.

In this User Guide you'll often see the term Master Model and the file extension "**XMM**" (which represents the combination of "Master Model" and "XML"). These references are meant to remind you of the opportunities you will have to further edit your Live 3D models to tweak them into the perfect Product Tour presentation.

The Meson™ Programming Language

More advanced features, such as 3D hotspots with pop-up text, or even changing the appearance of a Product Tour, can be added using the **Meson programming language**.

"Meson" is the name of a suite of connected technologies which allow interactive applications with both 2D and 3D elements to be developed quickly, and with a very small execution footprint. Like "Java" the name denotes a language, an object model of predefined classes, and a runtime execution environment.

About This User Guide

This User Guide is designed to help you learn the software quickly. You can read from front to back, or to pick and choose areas to cover, similar to a reference manual. Because of this design, you may notice some redundancies in explanations of terms, how to access a menu in order to locate a particular feature, etc. This design is meant to allow you to skip ahead if you like, without getting lost.

This User Guide is organized into five chapters with each taking a slightly different approach to help you get familiar with the software.

Chapter 1 – Welcome to Strata Live 3D CX 2
This chapter (the one you're reading now) provides a description of how to use the new StrataLive3D.com web hosting service, and an overview of Live 3D and this User Guide.

Chapter 2 – Getting Started
This chapter covers installing and getting acquainted with the software, as well as a very simple tutorial to get you up on your feet and quickly creating content. By the end of this short chapter you'll be looking at your first interactive 3D content in a web browser that you've created using Live 3D.

Chapter 3 – The Workspace
This chapter takes you through the interface in a logical, step-by-step process. This approach is meant to get you familiar with all the functions available in Live 3D.

Chapter 4 – The Workflow
This chapter walks you through the logic of how you might approach a project – starting with getting your model into the software and ending with export options.

Chapter 5 – Live 3D Tutorials
These tutorials go into much greater detail about the process of creating interactive content than the simple tutorial in Chapter 2.

Appendix
The Appendix contains information about getting Strata support and some helpful information about how to solve problems you may encounter. Also included is a Glossary of Terms.

Live 3D Feature Overview

- Upload your content to StrataLive3D.com, the revolutionary web service that is part of the Strata Live 3D CX 2 toolset
- Imports VRML, DWF, and WIRE formatted files
- Automatically extracts geometry, appearance, and animation
- Edit hierarchy and object names
- Copy/Paste sections of the hierarchy
- Copy/Paste parts between different models
- Export meshes to VRML for editing in other tools
- Scale, rotate, and move mesh data
- Adjust positions, orientation, and pivot points of objects
- Insert flexible wires, cables, straps and sheets, using dynamic Elliptical Hermite Lofts
- Adjust scene lighting and orientation
- Create new range-of-motion animations
- Create material swaps (for texture or color changes)
- Create color curve animations
- Create object and material fade animations
- Edit material properties: color, texture, lighting
- Edit mesh smoothing groups
- Set up initial object position, zoom and rotate limits, etc.
- Graphically create animation scripts moving multiple parts, camera view, scene orientation, and lighting

- Easily specify conditional relationships between scripts, to create robust simulations
- Automatically select texture and geometry compression parameters
- Preview web compression and streaming prior to export
- Handles models with hundreds of megabytes of texture
- Handles models with millions of polygons
- Optimizer automatically reduces polygon count, under user control
- Optimizer automatically eliminates unneeded hierarchy
- Easily edit underlying XML representation of Master Model
- Create and edit meta-data associated with the model
- Export animated models to plug-in-free Web 3D
- Export animated models to plug-in-free 3D PDF
- Available for both Windows & Mac

3D PDF Capabilities

- 3D PDF requires no special plug-ins: works in Adobe® Reader
- Generate 3D PDF directly from Live 3D CX 2, no Acrobat® required
- Edit generated 3D PDF's using Illustrator® or Acrobat
- Insert animated 3D models in any PDF using Acrobat Professional® or Acrobat 3D®
- Automatically includes all animation behavior: no Javascripting™ required
- Automatically includes easy-to-use interactive Navigation Bar
- Automatically includes unique "Measure" feature
- Automatically compresses all textures to ensure best performance on all hardware
- Uses proprietary optimization to produce far smaller PDF files (typically 50-70% smaller than other tools)
- Most robust U3D compressor in the industry – easily handles models that crash other tools

- Only solution that supports enhanced, dynamic lighting models not found in U3D
- Only solution that supports real-time texture and color swaps

Web 3D Capabilities

- Upload your content to StrataLive3D.com, the revolutionary web service that is part of Strata Live 3D CX 2
- Strata Live 3D CX 2 viewer requires no special plug-ins: relies on Java 1.1 or later
- Strata Live 3D CX 2 "just works" on more than 90% of computers (Windows, Mac, Linux, Solaris, etc...)
- Uses sophisticated Meson Platform for rich 2D interfaces and dynamic 3D scenes
- Comprehensive optimization produces the smallest files in the industry
- All HTML generated completely automatically

Web Viewer 3D Capabilities

- Dedkov compression produces the smallest 3D models across the largest range of model types (from photo-real high-texture models, to untextured scanned models)
- JPEG, GIF, and Wavelet-streaming textures
- Dynamic textures can be generated by a Meson program:
- To embed 3D scenes onto texture in 3D scenes (for example, to show a moving scene on a camcorder model's view screen)
- To use rendered text in the 3D scene (for example, to simulate the menu system of a mobile phone)
- Real-time, dynamically generated shadows
- Perspective-correct, bi-linear filtered textures of unlimited dimensions
- MIP-map-style continuous texture anti-aliasing
- 32-bit ARGB, 16- and 12-bit YCrCb, and 8-bit Y (constant CrCb) texture pixel formats, with optional error-diffusion dither
- Photoshop-compatible color curves applied to texture images in real time

- Real-time edge anti-aliasing
- Stable-scene 256x over-sample progressive anti-aliasing
- Perspective-correct Phong shader with no performance penalty
- Specular highlights and chrome shading model (to convey shininess without the need for cumbersome reflection maps)
- Dynamically-generated flexible objects (elliptical hermite lofts), for modeling wires, ribbon cables, straps, paper, etc.
- Illustration rendering mode automatically turns 3D models into "sketches." Support for both line drawing over realistic shading, and line drawing over flat color
- Reuse the animated Master Model in 3D PDF, and on the web

Web Viewer 2D Capabilities

- Alpha channel compositing of an arbitrary numbers of layers
- Smooth animation of any attribute (such as alpha, or position)
- Hot areas, including pickable pixels, and rectangular areas
- Mouse cursor control
- Context (right click) menu
- Unicode support for multi-lingual applications
- Anti-aliasing text engine with CSS-like font control, drop shadow generation, and internationalized word-wrapping capability
- Multi-state images and text (for mouse-over or push-button effects, for example)
- Separate images for color/alpha information (for example, to use a JPEG image for color, and a grayscale GIF for the alpha channel)
- Image tiling (primarily for repeating backgrounds)
- Rotation, scale, skew, bilinear-filtering, and over-sampling of any 2D element, including rendered text or even the rendered 3D scene
- Wavelet-streaming encoded images

1.2 Using StrataLive3D.com

StrataLive3D.com is a revolutionary web service that is part of Strata Live 3D CX 2. New in version 2, StrataLive3D.com makes it easy to place 3D graphics on the web. You can add your models to the StrataLive3D.com public gallery, embed models in your own site, or generate a unique URL for selected clients to view your 3D projects.

The StrataLive3D.com public gallery provides you with a unique URL that you can give to clients for easy online viewing. StrataLive3D.com makes it easy to add your 3D content to blog and websites, just like a YouTube video. The Strata Live 3D hosting service comes free with the purchase of your Live 3D CX 2 license.

Getting Started

1. Create an account at StrataLive3D.com

(You will need to register your serial number with Strata first).

2. Upload your Live 3D project from within the Live 3D application, using Export > Direct to Web.

3. Edit the display settings, if needed.

You now have 3D content on the web. You're also set up for placing as many additional models into your account as you would like. Just use the Direct to Web command in your Live 3D application and your 3D model will automatically be added to your account on the website.

Getting Started - Step by step:
Step 1 - Create an account at StrataLive3D.com
StrataLive3D.com uses the same log-on email and password as Strata's registration database.

If you have already registered your Live 3D serial number at http:// register.strata.com, you can use that log-in (your email address) and password, and StrataLive3D.com will recognize you the first time you log on. An account will be created automatically on StrataLive3D.com.

If you have not yet registered your serial number, **you will not be able to log in to StrataLive3D.com.** Instead, you will be prompted to go to Strata's registrations site, http:// register.strata.com, Strata's registration site. There you will need to **first** create an account (if you haven't already) and **second**, register your new Live 3D CX 2 serial number.

Once you register your serial number, you will be able to log on to StrataLive3D.com, using the same email and password.

Step 2 - Upload Your Content

You can upload your content to StrataLive3D.com from within the Strata Live 3D CX 2 application. Simply select **Direct to Web** from the Export menu, and your project will be uploaded to the website.

You may need to be log on to StrataLive3D.com to use the Direct to Web command successfully. Make sure you complete Step 1 (create your account) first. You will see a "Successful Upload" message in orange on the left side of the StrataLive3D.com page when your content is successfully uploaded.

Step 3 - Edit Your Live 3d Content

Once you have uploaded content to StrataLive3D.com, you have several options for managing your content. You can delete content, preview your 3D objects, edit your default settings, change the privacy setting, etc. All of these options are described below.

Click the "Edit online Live 3D assets" link on the left side of the website to view or edit your 3D object.

Making 3D Content Available for Public Viewing

Once you have uploaded 3D content, there are three ways you can allow others to view your 3D object:

- Add it to the Public Gallery by setting the Privacy option to Public.
- Embed it into a website or blog by generating and using the Embed Code.
- Generate and distribute a Model URL. If you use the Semi-Private setting, the object won't be visible in the Public Gallery, but it will be available to your clients or others who know the URL. You can also set the object to Public; it will then appear in the Public Gallery, and **also** be available at the Model URL.

Public Gallery

To allow already uploaded content to be viewed in the public gallery, navigate to your private gallery section by clicking on the "Edit online Live 3D assets" button on the left side of the StrataLive3D.com website. You will see a thumbnail image (or images if you've uploaded more than one model to your account).

Below the thumbnail image you'll see a series of buttons: **View, Edit, Delete, Embed, URL** and **Private/Public/Semi-Private** (this button toggles between privacy states).

To add the content to the public gallery and allow it to be viewed on the StrataLive 3D website, set the Privacy button to Public.

Embedding 3D Content

Many online website building systems and blog editing systems allow you to enter html code into the site. This is how you can place YouTube videos or other third party content on your website, and StrataLive3D.com uses the same method.

To access the html code to use in your website navigate to the 3D content thumbnail in your private StrataLive3D.com gallery (see section above), and click on the **Embed** button. In the dialog that opens, copy the html code (it will begin with <iframe src="http://www.stratalive3d.com...) then paste it into your website or blog.

> **NOTE:** *Your 3D object must be set to Public for it to be visible as embedded content on your website.*

Generating a Private URL

You can also have your 3D objects hosted on the StrataLive3D.com website, with a private URL, so only clients or others who know the URL can view the objects.

To generate a private URL, make your object's privacy setting **Public** or **Semi-Private** (not Private). Next, click on the **URL** button. A window will open showing you the unique URL which has been generated for you. You can copy and paste this URL to send to clients.

Personal Site Administration

On the left side of the StrataLive3D.com website you'll find a section titled "Personal Site Admin". This section gives lets you you log in and out of the website, and manage your content and settings.

Edit Online Live 3d Assets

Click this button to access your private gallery. This is where you can access each uploaded project to edit its settings. For a full description of the available settings, see below.

Set Upload Default Settings

Here you can make default settings that will affect any uploaded content. These settings are described below.

Making Default Upload Settings

Click the "Set upload default settings" button on the left side of the StrataLive3D.com website to access the default settings for your uploaded 3D objects.

You'll find many of the same settings here in the Display Infomation Section that are available when editing the settings for a single 3D object.

However, the default settings you make in this page will be applied to each new object you export from Strata Live 3D to your online account. You can change the settings on any individual object at any time. As with other settings, you must be logged into your account prior to gaining access.

Editing Online Live 3D Assets

Clicking the Edit Online Live 3D Assets button on the main web page takes you to a gallery of your online 3D objects. This is your personal administration area, where you can easily manage all of your Live 3D assets.

Each object that you have uploaded to StrataLive3D.com will be represented by a thumbnail. Under each thumbnail is a series of buttons. There are six options available here: **View**, **Edit**, **Delete**, **Embed**, **URL**, and the **Privacy** button. (The Privacy setting button toggles between Public, Private and Semi-Private.)

View

This button opens a Preview window where you can view your Live 3D object. You can also use this window to scroll back and forth among all of the objects you have posted to StrataLive3D.com.

Edit

This opens the Edit Object area for the selected 3D object. See below for more information about the available settings.

Delete

This button deletes the Live 3D object from the StrataLive3D.com website.

Embed

This button generates the html code you will need to embed your Strata Live 3D object in a webpage.

URL
This button generates a unique URL that you can give to clients or other to let them view your Live 3D object. Your object needs to have a privacy setting of Public or Semi-Private for it to be seen by others using the generated URL.

Privacy
Here you can set the privacy status for your 3D object. This button toggles between Private, Semi-Private and Public.

- Public adds the object to the StrataLive3D.com Public gallery and makes the object visible to anyone who logs on to StrataLive3D.com.

- Private files will only be displayed in your admin section of Live3D.com.

- Semi-Private models will not be displayed in the Public gallery, but will be displayed in embedded situations.

Edit Settings for 3D Objects

Clicking the Edit button under the thumbnail of a 3D object on your online assets page brings up the editing window.

Overall settings

- Thumbnail
The Thumbnail image is automatically generated from the "rest" position of your Live 3D file.

- Preview
Use the preview button at the top right of the page to see how the changes you've made have effected the display of your Live 3D file. Note that the preview does not reflect the saved state of your file online, just the current settings - including any changes you may have made. Make sure to finalize your changes by clicking one of the "Save Settings" buttons.

- Save Settings

The Save Settings button is available at the top right of the Edit page, and also in the lower right corner. Once you make changes, make sure you finalize the changes by selecting one of the Save Settings buttons.

- Delete Object
In the lower right corner, you will see the Delete Object button. Use this button to delete your object from the Strata Live 3D website.

Display Information Section
The display information that can be edited includes the following:

- Title
This is the name that the object will display under the thumbnail in both the public and private galleries.

- Privacy Status
Public adds the object to the StrataLive3D.com Public gallery and makes the object visible to anyone who logs on to StrataLive3D.com.

Private files will only be displayed in your admin section of Live3D.com.

Semi-Private models will not be displayed in the Public gallery, but will be displayed in embedded situations.

- Display Dimensions
Use this field to specify the width and height of the object's display area, in pixels. This size setting is used for both the galleries on StrataLive3D.com and when the content is embedded into your own websites.

- Background Color
Here you can set the background color for the display of your 3D content. You can enter a number in the field, or use the Hex Color Guide to make an html compatible color selection. Hex is the color system used for web content. Hex codes can be copied from the color picker in Photoshop and other graphics applications.

- Object Shadow
Use these controls to turn shadows on and off, and set shadow opacity, softness and distance.

- Navigation
Here you can set the navigation of your object to Object (the default single object rotation setting) or None.

None uses the basic object rotation for object viewing, with no navigation bar. Viewers can click and drag on the 3D object to rotate it.

With the Object (default) radio button selected, you will see a preview of the navigation bar that will display with your content. Clicking Choose Navigation Bar gives you access to a library of additional navigation bars to choose from, including a selection from the Strata Community website, StrataCafe.com.

- Illustration Mode

Illustration Mode turns on ink-like outlines in your object's display. Enabling this option gives you access to the edge controls: Edge Width, Crease Angle and Edge Color.

Crease Angle determines the angle at which an edge is drawn - a higher setting will usually cause more edges to be drawn. Edge Width lets you set the width of the outline in pixels. You can set the Edge Color of the outline using the field or the Hex Color Guide.

- Behaviors

Use the pop-up menu to select an object behavior. Presently you can select one of three Auto-Rotation speeds: Slow, Medium or Fast. You can also choose None to have no rotation on your object.

Chapter 2

Getting Started

2.1 Installation and Setup

Installing Strata Live 3D CX 2 is very straight forward and similar to software installations you may have done in the past.

System Requirements

Strata Live 3D CX 2 can be installed on Windows 2000, XP, Vista, Windows 7 or Mac OS X operating systems.

Like any 3D program, this software is CPU, memory and graphics intensive. The following minimum configuration is provided; however complex models and textures may demand greater system capacity to run efficiently. If you experience sluggish response with larger models and textures, consider upgrading your system.

Minimum system configuration

Windows

- Processor: Intel Pentium or Celeron, AMD Athlon, and equivalents at 1GHz of faster.
- Memory: 512Mb, 1Gb highly recommended.
- Video: 64Mb, DirectX9c compatible. 800 x 600 resolution or better.
- Hard Drive: 45Mb free space for the program files.

Mac OS X

- Power Macintosh with Mac OS X 10.3 or higher
- Memory: 512 MB RAM, 1 Gb highly recommended
- Video: Support for resolutions above 800 x 600
- Hard drive: 45 mb of free space for installation

Installation

Installation should be run within an account that has Administrator or Power User privileges.

Simply run the Installer program and follow the instructions. The first time you run Strata Live 3D CX 2 you'll be asked to enter the Serial Number you received with your purchase.

2.2 A Tutorial for Creating Your First 3D Content

This tutorial will guide you through creating your first 3D content and trying out the **basic features** of Live 3D. The tutorial utilizes a model that was created by taking digital photographs of a child's toy dinosaur and then using Strata Foto 3D CX 2 to generate the 3D geometry and texture.

Step 1: Launch the Application

When you launch Live 3D, three of the ten available windows, or palettes, as they're called in Live 3D, are opened. These palettes include the main application palette; the Info palette; and the 3D View palette.

Step 2: Import the 3D Model

This project will utilize a VRML file named "**Saber Dino**". To bring the VRML file into Live 3D go to the File menu and select Import > VRML 2. The menu bar can be found at the top of the main Live 3D palette.

When you select the **File > Import > VRML 2** command, the Open dialog appears. The dialog, like all interface elements in Live 3D, is a Java standards based dialog, and may appear different than standard Windows or Mac dialogs.

Navigate to the **Tutorial Files** folder which can be found in the Strata Live 3D CX 2 application folder on your hard drive.

On **Windows** this will be located on your main C drive, in the Programs folder, then the Strata folder, and then the Strata Live 3D CX 2 folder (**C:\Program Files\Strata\Strata Live 3D CX 2\Tutorial Files**).

For Mac users, look in the Applications folder on your main hard drive, then the Strata Live 3D CX 2 folder (**Hard Drive/Applications/Strata Live 3D CX 2/Tutorial Files**).

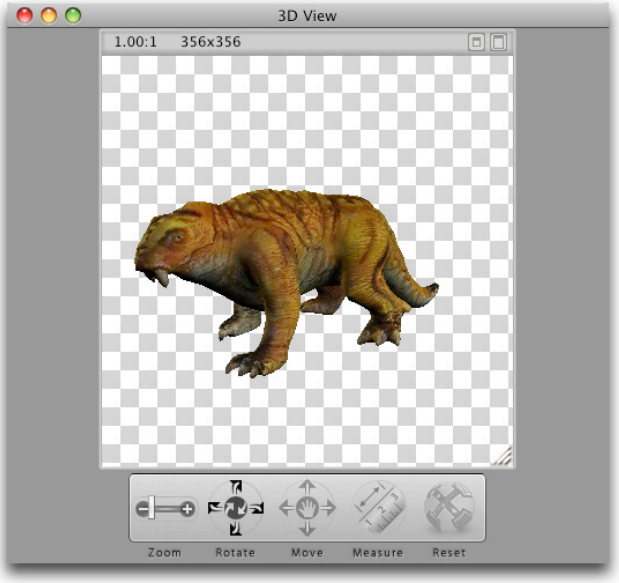
Select the file Saber Dino.wrl (.wrl identifies a VRML files). Now click on the "Open" button.

Step 3: Explore the Navigation Bar Interface

Let's have a look at the model. Go to the **3D View palette**. Click and drag the Saber Dino. You'll see that as you drag the model rotates. Now click on the "**Move**" icon in the Navigation Bar at the bottom of the 3D View palette. You see the Move icon becomes the **selected tool**.

Now when you click and drag the model moves in the view pane. Next, click on the **Zoom** icon. You'll note that if you click on the right side of the Zoom icon (on the +) the view will get closer to the Dino. You can also drag the Zoom slider to zoom in and out.

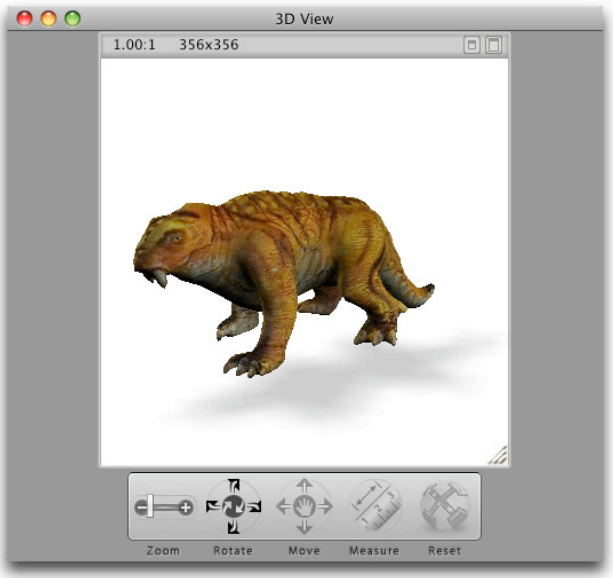
Now click on the **Measure** icon and use the Measure tool to see how long the Dino is by clicking on his nose and drag to his tail. Now click on the **Reset** icon. Saber Dino is back where we started.



Step 4: Enhance the 3D View

Though the Saber Dino looked pretty good as you were rotating and moving him, we can do a couple of things to make him look more realistic while working inside Live 3D. Go to the View menu and select Solid Background (**View > Solid Background**). Now you should have a white background behind the Saber Dino. The previous checkerboard background indicated transparency.

Now try rotating the Dino around. We're getting a better view of him, but there's one more, easy to do step that will jump the realism up. Go back to the View menu and select Shadow (View > Shadow). Now when you rotate him around you'll see that there's a simple drop shadow under him. This helps to **visually ground** the model and gives a greater sense of dimensionality.



Step 5: Output Your 3D Web Tour

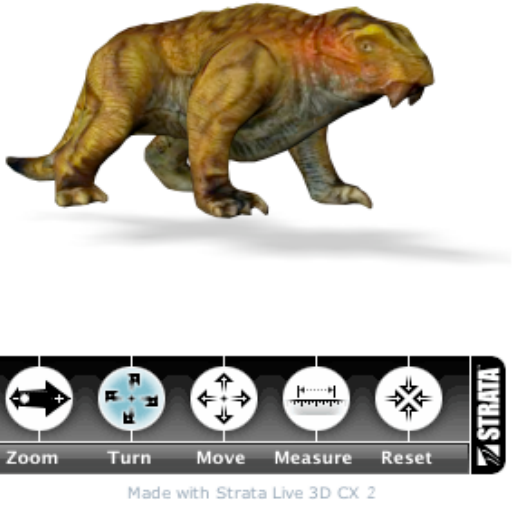
Now we'll output a simple file for viewing in web browsers. This is as easy as selecting **Export > Web > Examine**. This will create an object that you can rotate and move within your default web browser.

When you select the above Export command, you will be presented with the "**Save**" dialog. You may want to save the model into its own folder because exported web tours contain several support files. Choose a name for this file

(SaberDino would be fine) and click on the "Save" button. You'll note that the name we've suggested (SaberDino) does not contain a space or any special characters. Web browsers don't like files with names containing spaces and/or special characters.

Step 6: Test Out the Model in Your Browser

Your Saber Dino model will should open in your default web browsing application. At the bottom will be the standard Navigation Bar supplied with Live 3D. You'll notice that this is a different Navigation Bar than the straight forward controller in the 3D View palette.



Test out rotating, moving, zooming and even measuring Saber Dino. Just as in the 3D View palette, you can test these different functions by just clicking on the corresponding button on the Navigation Bar. You can always click on the Reset button to put him back the way he was to begin with.

Obviously there is much, much more you can do with Live 3D. Additional tutorials are available in the chapter titled "**Live 3D Tutorials.**"

There you'll learn about creating **Levels of Detail** to reduce the overall polygon count of objects to make them more appropriate for real-time graphics. You'll learn about creating animated models, creating custom Navigation Bars, and even editing the Master Model XML code.

Chapter 3

The Workspace

3.1 Palettes, Windows and Java

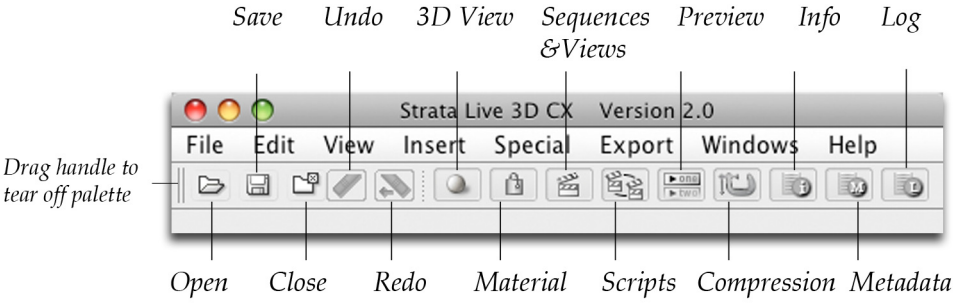
When Strata Live 3D CX 2 is launched, a number **palettes** are created. Strata Live 3D CX 2 is written in Java, so in Windows, each of these palettes has its own tab on the taskbar.

On Mac systems, the palettes are stacked within one document on the Application Dock. This is not standard, but we know you'll appreciate the **benefits of Java** for both cross-platform consistency and plug-in free viewing of the finished content.

These palettes are used to provide clusters of functionality. You can move the palettes around to any configuration you like, and the placement will be saved for future sessions. If you have multiple monitors, you may want to put the 3D View palette on one monitor, and other palettes on the other monitor. Make sure that the 3D View palette is on the monitor using the best graphics card.

3.2 The Toolbar

The Toolbar resides at the top of the main Live 3D palette, just below the menu bar. The Toolbar can be used to perform many of the major functions of Live 3D or to gain quick access to additional palettes. The buttons on the Toolbar are shortcuts to frequently-used menu items. These same functions can also be accessed via command keys.



The Toolbar can be dragged off of the main palette to become its own, separate palette. Just click and drag on the double lines on the left side of the Toolbar.

Float the cursor over each button to see a pop-up showing the button function. For detailed descriptions of the commands represented in the Toolbar, see the descriptions in the Main Menu section below.

3.3 The Main Menu

The main menu is located at the top of the main palette – the Live 3D palette. This menu gives access to most of the functions within Live 3D. A few of these functions also have shortcut buttons in the Toolbar directly below the menu. This section of the User Guide gives an overview of each function available from the main menu.

File Menu

Use this menu to create a new Master Model, open an existing one, import geometry and manage saving of your projects.

New >

Empty Master Model

This command creates a new, empty model. You will be immediately prompted to give it a file name.

Image Loop Master Model

This is a special kind of Master Model for making cylindrical 3D slide shows. Upon selection, a dialog comes up asking you to select a series of images. You

can use as many images as you like. Live 3D will automatically construct a cylinder with the same number of sides as images you imported.

> **NOTE:** *If a model is open already, you will be prompted to save changes. In Live 3D you only work with one model at a time, so open models must be closed before a new file can be created.*

Open...
Opens an existing model file saved in either the **XMM** (Live 3D Master Model) format or the **VRML** (Virtual Reality Modeling Language) format.

Hotkeys:

Control (Ctrl) and "O" on Windows

Command (Cmd) and "O" on Macintosh

Ordinarily, the Master Model is stored in an .xmm file, which is a ZIP-style file archive but with a different extension (.xmm vs. .zip).

Sometimes, such as when working on models with a lot of textures, it may be useful to work with the unzipped version of the XMM file. To unzip the .xmm file, just change the file extension from .xmm to .zip. You should now be able to unzip the file using a compression utility, such as WinZip or StuffIt Expander. Once the file is unzipped, you can navigate to the folder containing the unzipped data, and open the file named **MASTER.XML** that appears in that folder. You can also directly save an uncompressed model using the Save As command.

Live 3D will look in that directory for all ancillary files referenced in this Master Model file. When you are through editing the Master Model, you can use Save As to save the collection of files as an **XMM archive** once again.

You can also open files by **dragging and dropping** onto the main Live 3D palette.

Reload XML...
This menu item is used when editing the XML of a Master Model outside Live 3D, using a text editor. It is much faster to reload the XML than it would be to close and re-open the entire XMM file, as it is not necessary to reload textures that have not been changed.

Import >
Use import to insert geometry into your model. Import supports VRML and K3D files. Note that Import either replaces the geometry you have in

your current model or closes the existing XMM document and imports the model into a new document. Import is not for adding geometry to a model with existing geometry. To assemble multiple objects into a single model file use a full modeling application such as Strata Design 3D CX. For more information on importing, and ways to deal with some special situations, check the Troubleshooting section in the Appendix, near the end of this User Guide.

VRML 2 (VRML 97)...

Selecting the VRML command imports a 3D model in VRML (**.wrl**) format created by Strata Design 3D CX, Maya, Silo or similar 3D modeling programs (this format is also sometimes called X3D).

> **NOTE:** *VRML, though an industry standard format for objects and scenes, is an imperfect interchange format. There are an unlimited number of ways to describe the same objects and scene elements in VRML; thus, the Live 3D import feature was designed and optimized to read VRML files generated by the more popular 3D modeling programs, but it may not handle just any VRML file.*

K3D...

Selecting K3D imports a 3D model in the K3D format, a legacy format from Kaon Interactive's product Activate!3D Author.

Save

This command saves the Live 3D model in the Master Model XMM format with the model's current name. The current name may be one you selected from a previous save or acquired from an imported model.

Hotkeys:

Control (Ctrl) and "S" on Windows

Command (Cmd) and "S" on Macintosh

Save As...

Save As allows saving the Master Model with a new name and location.

> **NOTE:** *If you navigate into a folder and specifically type the name MASTER.XML, the XMM data will be saved and unpacked into that folder. This process is discussed in detail in* **Editing the XML File** *found in Chapter 4 of this User Guide. This technique should not be used on models with more than a few hundred objects, however, as Windows performance drops dramatically when folders have thousands of files in them.*

Close
This command closes the current Master Model, allowing a new Master Model to be opened without restarting Live 3D.

Hotkeys:

Control (Ctrl) and "W" on Windows

Command (Cmd) and "W" on Macintosh

Exit
Selecting Exit closes all palettes and Exits the program.

Edit Menu

The Edit menu is used to assist you in editing important aspects of your Master Model project with the following commands:

Undo
A single level of Undo is available. Selecting **Edit > Undo**, clicking the **Undo button** in the Toolbar, or hitting control "Z" backs up to the previously checkpointed state of the 3D model. Checkpoints happen before any permanent operation. To see exactly what will be undone, float your cursor over the Undo Toolbar button, and wait for the tool tip.

Hotkeys:

Control (Ctrl) and "Z" on Windows

Command (Cmd) and "Z" on Macintosh

Redo
Selecting **Edit > Redo**, clicking the Redo button on the Toolbar, or hitting Command or Control "Y" reapplies the most recent Undo operation. To see exactly what will be redone, float your cursor over the Redo Toolbar button, and wait for the tool tip.

Hotkeys:

Control (Ctrl) and "Y" on Windows

Command (Cmd) and "Y" on Macintosh

Change All Materials >
The **Edit > Change All Materials >** menu contains shortcuts to globally modify attributes of all materials at once. Individual materials can be changed using the Materials palette. For detailed information about the Materials palette see the Palettes section of this chapter.

Materials are a collection of settings and an optional texture map. Settings such as Ambient Intensity and Glossiness can be individually managed within the Edit Material dialog.

> **NOTE Strata Design 3D CX users:** *The term "Materials" in Live 3D is basically equivalent to the term "Textures" in Strata Design 3D CX.*

Backface All
Sets all materials to show backfaces. In the Live 3D renderer (as with virtually all polygon based renderers) each object has a front face and a back face. Using this information, the rendering can be made more efficient if only the front side is required to be displayed. In Live 3D this decision is controlled via the materials. This setting can be individually managed in the Edit Material dialog in addition to globally changing the setting with this menu command.

Backface None
Sets all material backfaces to not be displayed. See Backface All above for a more detailed discussion about materials and backfacing polygons.

Light All Matte
This command changes all materials to use a Phong shader, with no specular highlights. Note that you may need to insert lights using the Insert > Light menu option in order for the Phong shader to illuminate the object properly.

Light All Specular
Changes all materials to use a Phong shader, with a specular intensity of 1. Note that you may need to insert lights using the Insert > Light menu option in order to create specular highlights.

Light None
This command changes all materials to use no lighting model. This is useful for materials that contain texture maps that are "pre-lit" (sometimes called a "baked-in" or "self-illuminated" texture).

UV Wrap All
Changes all materials to wrap textures that extend beyond the 0 to 1 range.

UV Wrap None
Changes all materials to clamp textures that extend beyond the 0 to 1 range.

Enhanced Lighting
Allows you to set the intensity of the Spherical Normal Effect. This works by bending normals outward, as though they were on a sphere instead of on a flat surface. This causes the specular highlights of directional lights to look more like the highlights of spot lights, giving you a more realistic lighting appearance without adding more geometry or using a more computationally intensive lighting model.

Using the Spherical Normal Effect on flat surfaces adds the appearance of a slight curve, which can add realism to your projects.

Alpha Sort >

Thorough
Orders, or sorts, the model's alpha triangles to allow proper display of transparency. This is required for the proper display of geometry that includes transparency/translucency.

Quick
Use this option if your model has no translucent surfaces that overlap each other from any view. This will give you a small performance boost.

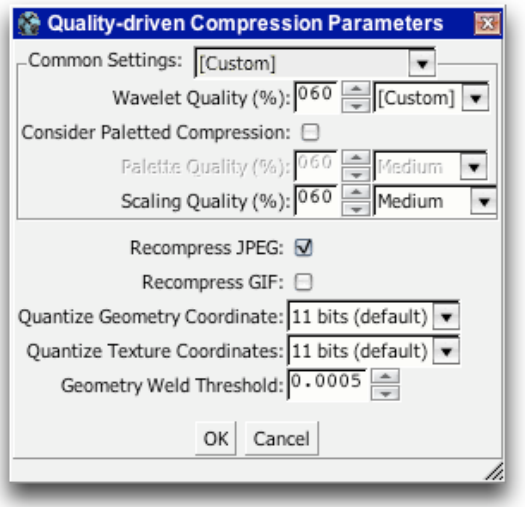
1-7 Pass Beta Blending (OpenGL Only)
These options optimize performance for the Meson Desktop Platform. Beta Blending is a proprietary method of showing complex translucent geometry that avoids the overhead of sorting triangles.

Change Aspect >
All views in the Master Model are defined assuming a certain aspect ratio. This menu lets you change the aspect ratio to some standard values (Portrait 3:4, Square 1:1 and Landscape 4:3). The 3D View palette will show the aspect ratio defined here. To change the aspect ratio of the finished web tour, simply edit the width and height numbers in the HTML file.

Dimensions
The Master Model format contains a global scale factor, which converts from local coordinates to millimeters. This menu command brings up the Edit Scene Dimensions dialog which allows you to set this scale factor directly, or in terms of the width, height, or depth of visible scene. This useful for adjusting the dimensions that will be displayed when a viewer checks the dimensions of your model using the Measure tool on the Navigation Bar.

Compression Parameters
This command brings up the **Quality-driven** Compression Parameters dialog. At the top of this dialog you'll find the **Common Settings** pop-up menu.

This menu provides the best approach for using some complex compression algorithms.



For a more detailed description of the individual settings of this dialog see the section on **Making Efficient Models** in Chapter 4 below.

Default Background Color
The Master Model contains a default background color, which some user interface templates will follow when displaying the 3D model. This menu item brings up a color picker that allows you to set this color. Note that to see the result on the screen, you will need to use the **View > Solid Background** menu item as well.

Delete >
Use this menu item to delete things from the Master Model. Note that deletions are **deep** – deleting a view deletes any script key frame that used that view, for example.

XML
This allows you to edit the XML of the Master Model directly using the **Edit XML dialog**. It can be used to make changes to things not exposed in the Live 3D user interface.

The Edit XML dialog is a very simple text editor and doesn't supply any special features, such as Search and Replace, so you may find that using a third party text editor is easier. If you want to use a different editor, just select the portion

of the XML code you want to edit, then copy and paste the copied code into the editor of your choice. When you're finished editing, just paste the text back into the Edit XML dialog.

> **NOTE:** *Simple text editors, such as WordPad on Windows, work best because they don't add any hidden formatting characters to the text.*

View Menu

The View menu contains commands that are used to manage the content of the 3D View palette and other aspects of the view which will help you determine what your final Product Tour will look like.

OpenGL Acceleration

This option allows OpenGL hardware acceleration in Live 3D CX. This can be useful, for example, when you import a model with a very high polygon count, and need to decimate it using the LOD feature.

> **NOTE**: *OpenGL Acceleration is not supported on every system, with every graphics card.*

Antialias

By default, the 3D View palette has antialiasing (smoothing of the rendered image) disabled to avoid using too much CPU power during the editing process. To see the model the way it will look in a Product Tour turn this option on.

There are two different approaches used for antialiasing: when the scene is changing, only edges are antialiased; when the scene stops changing, the entire scene is progressively redrawn with more antialiasing passes (up to a limit of 256 times oversampled). Note that in a Product Tour, MIPMaps are also used to avoid texture artifacts, but these are not shown in the 3D View palette.

Wireframe >

This option shows the triangle structure of the 3D model. You have the option of showing the wireframe overlaid on the 3D textured surface, or the wireframe alone on an untextured surface. This setting is useful for checking polygon level of detail (LOD) while in the 3D View palette. This setting is not used in the exported Product Tour.

Shadow

This option controls the display of the drop shadow in the 3D View palette. By default, regardless of how this menu command is set, Product Tours will be exported with a shadow. For web based product tours you can modify the

shadow, and even turn it off altogether, by editing the HTML file that is saved out with your exported Product Tour. To remove the shadow in the Product Tour, just open the HTML file, search for "Shadow" and change the alpha setting down to 0.0.

Solid Background
This option shows the model against a solid background color in the 3D View palette. Use the **Edit > Default Background Color** menu item to change the solid color.

Frame Rate
This option controls the display of the frame rate (frame updates per second, or FPS) in the 3D View palette. It appears in the upper right corner. It is in black text in a small font.

You can use this display as a rough guide of the performance users will see in web-based Product Tours generated from this model. Note that window size, triangle count, CPU speed, and video card performance all significantly impact frame rate.

Level of Detail >
This gives you the ability to select which Level of Detail (LOD) to display in the 3D View palette. Three levels are supported:

- **Highest**: Shows the highest defined level of detail (the most triangles and objects)
- **Lowest with All Objects**: Shows the lowest level of detail, except where doing so would eliminate objects. The Master Model format allows a level of detail Mesh to replace an entire hierarchy of objects. While this mesh would be shown with the "Lowest" strategy, the object hierarchy will be shown using the "Lowest with. All Objects" strategy.
- **Lowest**: Shows the lowest defined level of detail (fewest objects and triangles)

> **NOTE:** *Product Tours generated from the Master Model will choose a level of detail based upon the animation sequences used. In Live 3D, a template can also supply a polygon budget to be achieved, which can lead to a mix of various levels of detail.*

To see level of detail meshes for individual objects, use Isolate in 3D View from the right-click menu of the object hierarchy tree.

To generate levels of detail for a model from within Live 3D, right-click on the Root object in the object hierarchy tree and select "Generate LOD".

Triangle Counts
This option controls display of triangle counts in the object hierarchy tree. The polygon count of each mesh is displayed. If multiple levels of detail are defined, the triangle count of each is shown, separated by slashes.

Insert Menu

Use this menu to add new elements to the Master Model.

Sequence
Adds an animation sequence, and opens the Sequences and Views palette. You'll be prompted to specify the type of sequence to add, and if "Object sequence" is chosen, you also need to select the object on which the sequence operates.

Script
Adds a script and opens the Scripts palette. You'll be prompted to either begin the script by appending an existing script or to make a completely new one. If you decide to make a completely new script, you'll need to select an existing sequence or view to base the script on.

Bookmark
Creates a bookmark from the current script editor settings (active script and time value). This bookmark can be used to quickly set the camera and sequences to a particular configuration.

Light
This command adds a directional light to the scene. The Sequences and Views palette and the Scene Lighting dialog will open, and the Scene Lighting editing overlay will be displayed on the 3D View palette to allow you to position the light and set its intensity.

Material
Adds a material to the scene and opens the Materials palette.

Object >

Null
Adds a "Null" transform object to the hierarchy (useful for grouping other objects, or as an Elliptical Hermite Loft target).

Elliptical Hermite Loft
Adds an Elliptical Hermite Loft object to the hierarchy. These objects can be used to model cables, straps, papers, and other flexible objects.

Special Menu

This menu gives access to some special purpose functions, which are not likely to be needed by most typical Live 3D users.

QA Menu

This menu is used for performing Quality Assurance on a 3D model. It configures the interface in a well-defined way, to help ensure consistency.

Off

Turns off QA mode.

Web

Opens the Compression Preview palette with a fixed size, for QA of models destined for Web Product Tours.

Print

Configures the 3D View palette to aid QA of models destined for print applications. This includes adjusting the zoom limits and window size.

Normalize IDs

Re-assigns IDs in the Master Model to more closely match the descriptions of objects.

Unlimited Texture Memory

Switches to a mode in which there are no limits on texture memory, because any texture that doesn't fit will cause an existing texture to be dropped. This mode can make the 3D View palette unusable, because it can take minutes to render a single scene.

Reverse Backfacing Triangles

Analyzes the currently rendered scene in the 3D View palette and finds all meshes which are rendered in backface, and reverses the winding order of those meshes. While in principle this can be used to correct winding order of models, in practice most models have small cracks in them, which greatly limits the functionality of this command.

Weld Geometry

This command finds vertices that are within the Weld Threshold distance and joins them. It is used to eliminate visual artifacts such as cracks that might appear as a result of compression. The Weld Threshold distance is set in the Compression Parameters dialog, which is accessed through the Edit menu.

Rescale Entire Model
This command will rescale everything in the model by a constant factor. Use this when integrating models created with different units. To change the measurements displayed for the model, use the **Edit > Dimensions** command instead.

Convert Object Fade to Material Fade
Object fade sequences modify the "alpha" property of objects in the Master Model. Objects with transparency are treated very differently from materials with transparency.

For example, a semi-transparent object will completely obscure any object behind it which has material-level transparency (either an alpha setting in the material, or per-pixel alpha in the texture). Semi-transparent objects also completely obscure other semi-transparent objects that are not more opaque than them.

These rules allow you to fade an object without seeing a lot of artifacts caused by the presence or absence of backfacing triangles, and give object fade animations a much more natural appearance. Also, object fades propagate down the hierarchy to private children of the fading object.

In some rare cases, you will find that these behaviors are undesirable. For example, if you are fading a solid object in front of another object which is fundamentally transparent throughout (such as a glass jar), the fact that the faded object completely obscures the object behind it will lead to strange bleed-through of the background. In a case like this, it's better to hide the object by fading away its materials, using Convert Object Fade to Material Fade.

This converts an existing object fade into a material fade that changes all the materials used by the object. Note that this can have unexpected results if some of those materials are also used by other objects, or if the object being faded has private children in the hierarchy.

Set Default VRML Import Units
This command works in conjunction with the Rescale Entire Model command above. If you change your scale with the Rescale Entire Model command, the **Set Default VRML Import Units** command gives you the opportunity to use this relative scale as the default for importing VRML files.

Generate Alpha Channel Report
This command searches through a model's textures, and generates a report listing which textures have an alpha channel. This is useful as a QA tool, and as a reminder to set the material web settings for the materials using those textures to 32-bit color. The default setting of 16-bit color does not support alpha channels.

Check for Script Cycles
By default you cannot set a script to run a "before" script that references that script. However if you cut and paste the XML code incorrectly, the result can be a cycle in which a script references a before script, which references another script as its before, which reference the original script. This command detects that error, and if an error is found you will be directed to edit the Before conditions.

Show Warnings as Alerts
By default Warnings are shown in a dialog box. You can disable this dialog box, and then all warnings are sent only to the Log palette. Selecting this command re-enables the original behavior of showing dialogs for each warning.

Export Menu

Use the Export menu to save your finished 3D project to the web or to PDF.

Direct to Web
StrataLive3D.com is a revolutionary web service that is part of Strata Live 3D CX 2. StrataLive3D.com makes it easy to place 3D graphics on the web. You can add your models to the StrataLive3D.com public gallery, embed models in your own site, or generate a unique URL for selected clients to view your 3D projects.

The StrataLive3D.com public gallery provides you with a unique URL that you can give to clients for easy online viewing. StrataLive3D.com makes it easy to add your 3D content to blog and websites, just like a YouTube video. The Strata Live 3D hosting service comes free with the purchase of your Live 3D CX 2 license.

Once you have created a (free) account on StrataLive3D.com, you can use the **Direct to Web** export option to automatically upload your 3D objects to StrataLive3D.com.

For a step by step description of how to create an account and begin uploading to StrataLive3D.com, see **Chapter 1** in this User Guide.

Web >

Examine
This option exports the scene with the default Navigation Bar. It has controls which allow you to rotate, pan, and zoom on the model. Any scripts in the Master Model will be assigned to buttons in this interface.

Walk-Through
This is an alternate Navigation Bar user interface suitable for walk-through presentations for architecture, tradeshow, store interior, and similar applications. It has controls which allow you to move the camera location, and orientation, but not zoom or pan the camera. Any scripts in the Master Model will be assigned to buttons in this interface. For more information see **Section 4.8, Making Walk-Through Presentations.**

PDF >
This export option creates a PDF file with an embedded 3D model which Adobe Reader can display. You are able to choose from a selection of PDF templates for your design. After you've exported your 3D PDF file, you can open the PDF in Adobe Illustrator to add design elements to the page (the 3D element won't be visible in Illustrator). With Adobe Acrobat Pro and Acrobat 3D you can insert Live 3D content directly into any PDF document, such as product brochures, catalogs, technical manuals, etc. See Making Better 3D PDF Documents in CHapter 4, Section 4.8.

Other
These options allow you to create a compressed web model JAR, an HTML file with user interface controls, and all necessary extra files for the Product Tour (applet JARs, user interface JAR, etc.). Be sure to put this in an empty directory, to avoid accidentally overwriting files from other Product Tours. From the sub-menu you can choose the specific user interface template:

Examine (Choose Nav Bar)
This export option allows you to select a Navigation Bar from the Web Templates folder, found in the Live 3D application folder.


"Minimalist" Navigation Bar


Strata Red Navigation Bar


Gradient Navigation Bar

Standard Navigation Bar

Live 3D comes with four basic types of Navigation Bars. The standard bar is provided in six color combinations. You can also create your own Navigation Bars; see the Live 3D section of Support.Strata.com.

Examine (No Nav Bar)

This export option includes no user interface at all. The only behavior available is rotation control using the mouse. This is suitable for very simple web applications like animated logos, and is a clean starting point for writing a brand new user interface in the Meson language. All scripts defined in the model will be included in the model JAR file, but they will not be tied to any control buttons.

Compressed Web Model (JAR)

Creates a compressed web model JAR file containing all defined scripts. A JAR file (short for Java Archive) is a ZIP file used to distribute a set of Java classes.

Non-Animated Web Model (JAR)

Creates a compressed web model JAR file with no scripts or animations, and uses the initial state of the model to control optimizations. This will typically be smaller than a full web model. Any objects that are not visible will be optimized away; all object hierarchy will be optimized away, etc.

Non-Animated Low Resolution Web Model (JAR)

This is the same as a Non-Animated web model except that only the first three bands of wavelet texture data are included, resulting in a much smaller model.

Flash Embedding

This export option creates an ActionScript macro program which causes the Flash authoring application to create a default user interface for the product tour. This default interface can then be customized using Flash. The 3D component of the tour is still produced using the Java applet, but this option embeds the 3D component in a Flash movie, for added flexibility in authoring.

> **NOTE:** *Flash Embedding is an unsupported legacy feature and may not work with later versions of Flash.*

Image Loop

This option allows you to export an image loop with a simple navigation bar containing forward/back and zoom controls.

Windows Menu

This menu is used to open the various palettes. If the palette is already open, the menu item will bring it to the front. To close a palette, use the close button on the palette's title bar.

Each palette function is summarized in this section. Each palette is more fully explained in the Palettes section, later in this chapter.

3D View
Opens the 3D View palette for the Master Model.

Materials
The Materials palette presents a tree view of materials used in the Master Model, and allows editing of material properties.

Sequences & Views
The Sequences and Views palette allows you to edit named views and sequences.

Scripts
The Scripts palette allows you to edit scripts – which are combinations of sequence actions and camera moves – over time.

Preview Scripts
Opens the Preview Scripts palette. The Preview Scripts palette presents a set of buttons, one for each script. This is useful for testing the interactions of scripts, and making sure all preconditions and "before" scripts are properly set up.

Preview Compression
The Preview Compression palette is a second 3D window, slaved to the first, in which the full compressed web model is displayed. This can be used to do quality assurance (QA) of the compression settings (particularly texture compression), prior to generation of a Product Tour.

Info
The Info palette shows overall information about the Master Model, such as filename and triangle count.

Metadata
The Metadata palette lets you edit data about the Master Model, such as its name and copyright holder.

Log
The Log palette lists progress messages, warnings, and errors.

Help Menu

About...
Displays the application splash screen and your License Key (serial number.)

Tutorials
Links to additional tutorials on the Strata website.

User Manual
Opens the Live 3D User Guide from the Strata website. The manual accessed via this command may be more up to date than a previously acquired version.

Master Model Format
Links to the Master Model format specification on Strata's web site.

Meson Language Manual
Links to the documentation of the Meson language, used in exported web tours.

Extras
Links to samples, scripts, templates, etc. on the Strata website.

Check for Update
Checks with the Strata server to see if there is an update available for your version of Strata Live 3D CX.

3.4 The Palettes

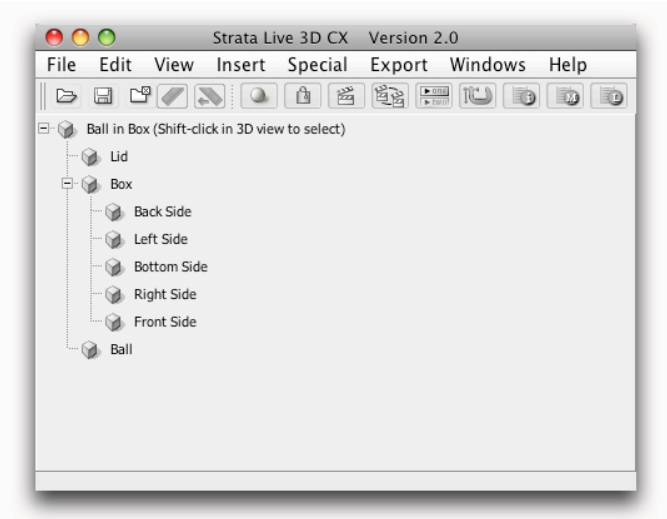
The windows in Live 3D are referred to as "Palettes". There are a variety of palettes for specific areas of functionality.

Live 3D Main Palette

The Live 3D main palette is home to the main menu and Toolbar, discussed in the previous section. In addition, the main palette contains the **object hierarchy**. The object hierarchy contains the structured list of objects and assets contained in the model.

The hierarchy is a "**parent and child**" relationship, providing an effective method of controlling the assets in your model. Model hierarchy is preserved from most imported models, including XMM and VRML models saved from Strata Design 3D CX.

The features and commands available from the object hierarchy are described below:



Public vs. Private
Each object in the Master Model is either public or private. In the hierarchy view, public objects are shown in black, while private objects are gray.

The biggest difference between public and private objects is the way they fade. Fading a public object (adjusting its alpha) fades its own mesh (if any), and the meshes of all private children.

Clicking on an object in this view (or clicking in the 3D View palette with the Shift key down) selects an object. The selected object is shown in red.

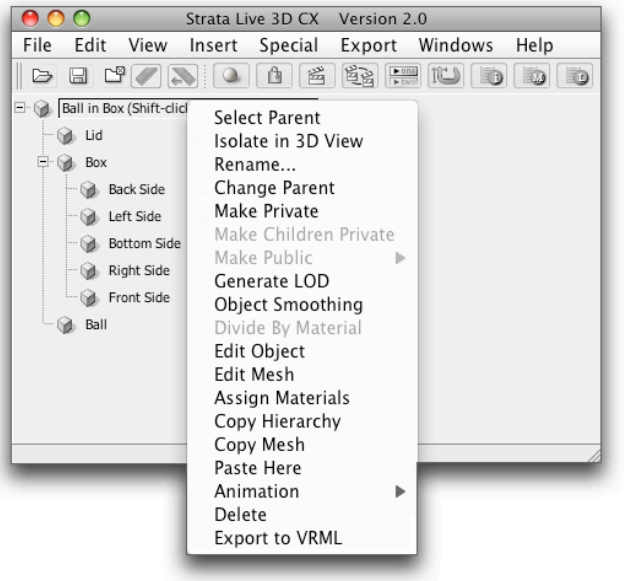
If the object has private children, they are shown in green. If the object itself is private, other private objects, which are part of the same public object as the selected one, are shown in blue (or tinted blue). Both the 3D view and the labels in the hierarchy are colored in this way.

To select no object, click on the root of the hierarchy tree, or hit the Esc key.

The description shown at the root of the tree is the Master Model title, which can be modified using the Metadata palette.

Contextual Right-Click Menu
Right-clicking on an object in the hierarchy brings up a menu of available operations. If an object is already selected (such as with a Shift-click in the 3D View palette), a right click off of the hierarchy area will bring up a menu for

the selected objects. These contextual menus help you manage objects and their attributes, and include the following commands:



Select Parent
Selects the object above the currently selected one in the hierarchy.

Isolate in 3D View
This menu command shows this object alone in the 3D View palette. The camera is automatically re-centered on the object, and distance is set to fill the screen. Using the checkboxes, meshes below and above this object in the hierarchy can be displayed as well.

Rename...
The Rename command allows you to change the name of the selected object. Note that all objects have an ID and a description. The ID never changes, and never appears in the Live 3D user interface. It is used to link objects with the animation sequences that control them, etc. This item edits the description, not the ID. The only way to change ID is using the **Edit > XML** menu command.

When you change the name of an object, any sequence that operates on that object and uses the old name of the object will be automatically updated to use the new name.

To change the name of the Root you must use the Metadata palette.

Change Parent
This menu command starts a change parent operation. The next object you click on will become the new parent of this object. Note that Change Parent is not available on objects which have sequences associated with them, since the coordinate values in those sequences would become meaningless.

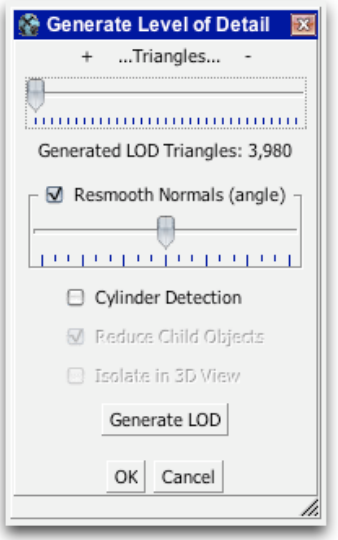
Make Private
Makes the selected object private. Any fade sequence that operates on this object is removed from the Master Model.

Make Children Private
This menu command makes all child objects of the selected object private. This is equivalent to using the Make Private menu item on each of those objects individually.

Make Public
This menu command makes a private object public. Since every object should have a fade sequence associated with it, you are given the choice of making a top-level fade sequence, or making this object fade together with the object it was fading with when it was private. To make the object fade together with some other object, choose a top-level fade, and then put that fade together with the other one using the **Sequences and Views** palette.

Generate LOD
This menu command brings up the **Generate Level of Detail** dialog. Use this dialog to generate a lower level of detail (LOD) for the selected object and optionally for its children. A lower level of detail is achieved for a polygon mesh by a process called decimation in which smaller triangles that face roughly the same direction are merged to form fewer larger triangles.

By adjusting the LOD, the mesh can be fine-tuned to strike a balance between reducing file size (which affects the web viewer's loading time and performance), and removing too much detail from the model.



Triangles

This controls the aggressiveness of the polygon decimation algorithm. The leftmost setting matches the result of an automatically generated LOD with no decimation. As you move the slider to the right, it will further reduce the triangle count. The value to choose is highly mesh-dependent, so the best strategy is to try several settings.

Resmooth Normals (angle)

Vertex normals are derived from adjacent face normals, using a common technique called "smoothing groups." When reducing the number of triangles, a finely beveled surface which used a single smoothing group might be turned into a sharp edge, for which smoothing is not appropriate. The Resmooth Normals control allows you to recalculate smoothing groups, based on the reduced triangles. This is almost always a good idea, as it will allow you to achieve lower polygon counts, without introducing shading anomalies. The slider controls the angular threshold used in smoothing group calculation. A low threshold (left) will lead to a more faceted appearance, while a high threshold (right) will lead to a smoother appearance, with hard boundaries only at sharp object corners.

A good strategy is to ignore lighting issues on the model as you adjust the triangle count, instead looking primarily at the quality of the geometry. Then, adjust the smoothing generation threshold to eliminate specular anomalies. And finally, boost triangle count, if necessary, to eliminate specular anomalies that smoothing groups could not correct. Remember, each time you change one

of the settings in the Generate Level of Detail dialog you need to click on the **Generate LOD button** to see the result of your changes.

> **NOTE:** *Specular effects are much more sensitive to the direction of surface normals than diffuse shading, so reducing the strength of specular and chrome effects in the Materials used by the object will also allow you to achieve lower polygon counts with a good visual appearance.*

Cylinder Detection

For models created with many programs, cylinder topologies are common. Cylinder Detection optimizes for this situation. Using this feature will take more time to generate LODs, but model complexity can be reduced much more effectively than with arbitrary tessellations (complex surfaces simulated with triangles). If the model was created using a NURBS tool like Alias Studio, cylinder topologies will not be present in the geometry and this option will not be needed.

Reduce Child Objects

This option applies decimation to all objects, public and private, below the selected object in the hierarchy. This is a destructive operation: if Generate LOD was previously used on any child object, that decimation will be lost and replaced with this new decimation.

Isolate in 3D View

This check box shows only the selected object (and child objects, if **Reduce Child Objects** is selected) in the 3D View.

Generate LOD

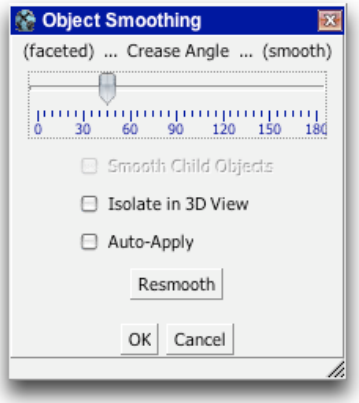
This button starts the decimation process, which can take anywhere from a second to several minutes, depending on the size of the meshes being reduced.

> **NOTE:** *After you Generate LOD for an object, you can immediately select a different object in the 3D View palette using Shift-click. This new selection will then be the target of the Generate LOD control.*

The first step of polygon reduction is welding together vertices which are in nearly the same place. When working with some models, this can change object topology, which impacts surface normals, resulting in drastic changes to the way light bounces off an object. For example, a box with sharp edges can suddenly look very rounded. The solution to this is to have proper smoothing groups assigned to each triangle, which controls the generation of vertex normals more precisely than object topology can. Smoothing group generation happens at model import time.

Object Smoothing

This is the next contextual right-click menu command after Generate LOD. This command brings up the Object Smoothing dialog. This dialog allows you to change every polygon in the mesh of the selected object to use a consistent approach to normal generation (smoothing), overriding the smoothing groups generated at model import.



Crease Angle

This slider controls the angle at which smoothing groups should change. Dragging the slider all the way to the left will give a completely faceted (not smooth) look, and dragging all the way to the right will give a completely smooth look. After adjusting the slider, click the **Resmooth button** to apply the change.

Smooth Child Objects

If selected, the smoothing checkbox will be applied to all objects, public and private, below this one in the hierarchy.

Isolate in 3D View

Shows only the selected object (and child objects, if Reduce Child Objects is selected) in the 3D View.

Auto-Apply

Ordinarily, you need to click the Resmooth button each time you move the slider to generate new smoothing groups. When the mesh you are working with is relatively small, you can work more quickly by enabling Auto-Apply. The smoothing will then be changed each time you move the slider.

Divide By Material

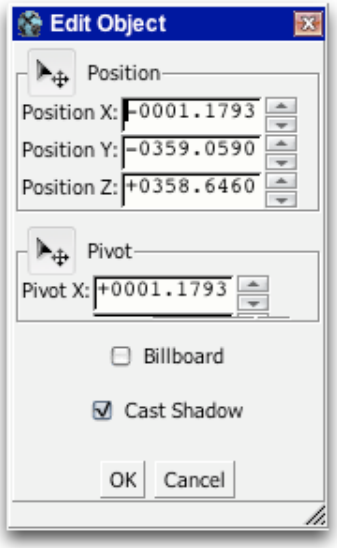
This contextual right-click menu command is only available on objects which have:

- A mesh
- No Level of Detail decimation (to restore, use Generate LOD, and generate with the triangles slider set to maximum – the leftmost position)
- Multiple materials within the mesh

For these objects, this command will divide the object into multiple objects, generating a different object and mesh for each material group.

Edit Object

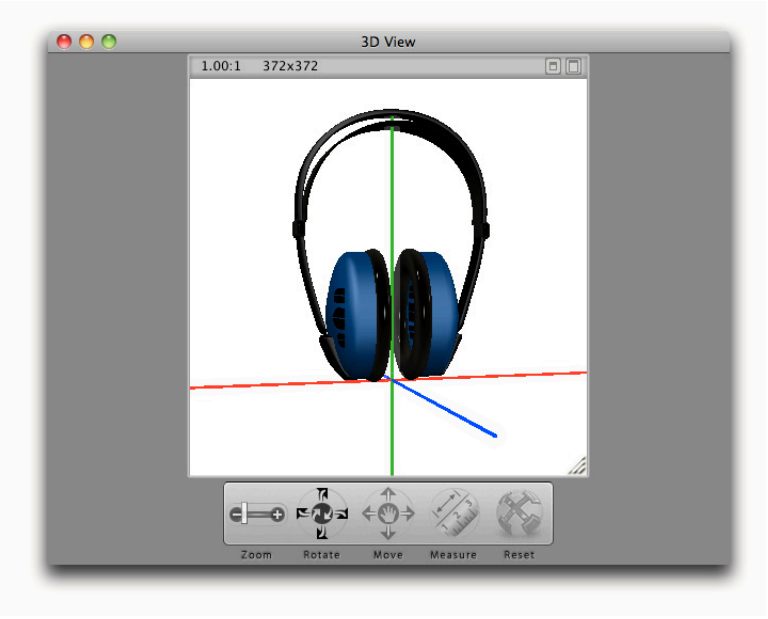
This command brings up the Edit Object dialog which allows editing of the object transform data. Note that if the object is moved by an animation sequence, some of the transform items may be disabled. To edit the transformations of such objects, edit the waypoints (similar to keyframes) of the appropriate animation sequences using the Sequences and Views palette.



Pressing the icon next to the Position, Pivot or Orientation button displays the manipulator in the 3D View palette. The manipulator can be oriented in the object's local, object's parent or the world coordinate system using the pull-down list next to the manipulator. Clicking the manipulator icon for the second

time enlarges the size of the manipulator in the 3D View, making it easier to use with certain objects. Clicking it for the third time turns it off.

To use any of the manipulators, first press the icon, then click on the manipulator in the 3D View. Drag with the mouse to move or rotate the object or its pivot point.



EHL Tab

If the Object is an Elliptical Hermite Loft (EHL), the Edit Object dialog has extra tabs across the bottom for editing the EHL configuration, and editing the EHL target object (An Elliptical Hermite Loft can be added to your model by using the Insert menu and selecting Insert > Object > Elliptical Hermite Loft...).

Once the EHL tab is selected, use the top pop-up menu to choose the target object. The EHL starts at the node in the hierarchy and goes to this target object. The **Likely Targets Only** checkbox reduces the list to only those objects which are likely to be EHL targets (other EHLs and empty leaf objects).

The Shape section includes major and minor ellipse radius controls (which can be locked together to make a circular loft), and source and target weight controls which dictate the shape of the Hermite curve.

The geometry detail section controls how many segments are used to model the Hermite curve, and how many segments around are used to model the ellipse.

Note that Phong shading will cause relatively low segment counts to look quite round nonetheless.

The appearance section selects the EHL material, and texture mapping properties.

Edit Mesh

This context menu command brings up the Edit Mesh dialog box. This option is similar to Edit Object, but instead of changing transform in the object hierarchy, it modifies the vertex data of the mesh directly. Note that if this is used on an object with LOD meshes, the transformations are applied to all of them.

Assign Materials

This menu command brings up a dialog allowing you to assign a different material to the selected object. All materials currently available in the model are presented in a pop-up menu.

You can also **duplicate** a material in this dialog, using the **Dup** button. This allows you to change the duplicated material without affecting other objects that are using it.

Copy Hierarchy

This contextual right-click menu command copies the hierarchy of objects, including all materials used by those objects and compression settings for images used by those materials, to the system clipboard. It wraps the objects in a Master Model.

Note that sequences and scripts which act on the objects in the hierarchy are not copied to the clipboard.

Copy Mesh

This command copies just the mesh of the selected object (and materials and compression settings) into the system clipboard. It wraps the mesh in an object and a Master Model. Copy Mesh lets you replace a single mesh with a new mesh.

Paste Here

This command pastes a Master Model from the system clipboard (see above commands Copy Hierarchy and Copy Mesh). The way paste happens depends on how the copy was done. If Copy Hierarchy was used, the objects will be **added** to the hierarchy under the selected node. If Copy Mesh was used, the mesh will **replace** the mesh of the selected node.

NOTE: *Pasting always creates new materials in the destination hierarchy as well. Thus, it is often useful to use the Edit > Delete > Unused Materials menu item after using Copy / Paste / Delete operations to eliminate materials which are no longer used.*

Animation

This contextual right-click menu command is the equivalent of choosing Insert > Sequence… from the main menu bar, and then selecting the object from the **Insert Sequence dialog**. The advantage of using the Animation command from this menu is that you can bypass the step of selecting the object from a pop-up menu in a dialog. Live 3D knows which object you wish to add the animation sequence to because all of these contextual right-click menu commands operate on the currently selected object.

Delete

This contextual right-click menu command deletes the selected object from the scene.

Export to VRML

This command allows you to save the hierarchy of objects into a VRML file. This is useful so that you can read this VRML file into a 3D authoring program, modify the meshes as needed, and then bring the edited content back into Live 3D using the Copy & Paste functions described above.

3D View Palette

This palette provides a preview of what your 3D scene will look like. You can also use a variety of functions in this palette to assist in scripting.

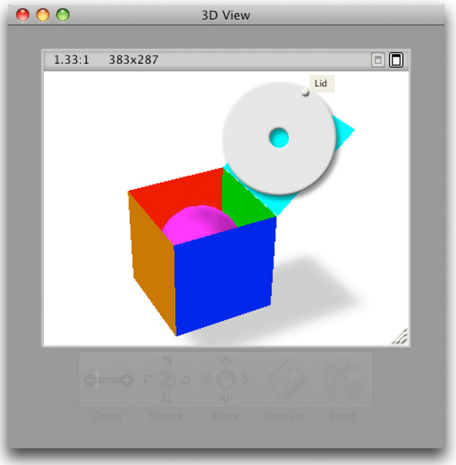
Sizing the Window

The title bar of the embedded viewing window in this palette shows the current aspect ratio (change using **Edit > Change Aspect**), and the window size in pixels. To change the window size, use the grow box in the lower right corner.

Sequence Disc Pop-Up

In the 3D View palette, right-click on the object of choice and hold down the mouse button to get the Sequence Disc. This is a special kind of pop-up menu, which allows you to adjust the state of any sequence that modifies the state of the object and/or material.

The **Sequence Disc Controller** *provides access to animation sequences in the* **3D View palette.**



NOTE: *If the Scripts palette is open, using this disc will also add event markers.*

Selecting Objects

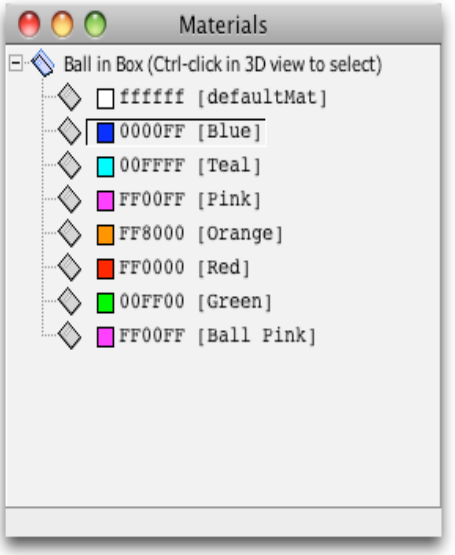
Shift-click on an object in the 3D View palette to select it in the object hierarchy in the main palette.

Selecting Materials

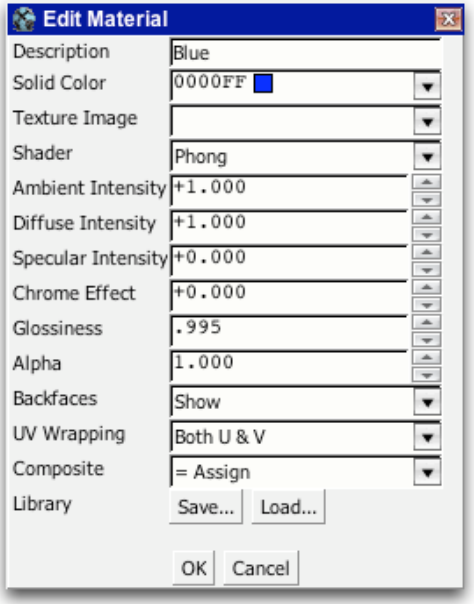
Ctrl-click on an object in the 3D View palette to select its material in the Material palette.

Materials Palette

This palette shows all the materials defined in the current Master Model. You can select a material using the 3D View palette by **Ctrl-clicking** on the desired object. Note that you can do this even if the Edit Material dialog is open.



Inside the Materials palette, **right-click** on a material name to access a context menu. This menu contains these entries: Edit; Web Settings, Add Alternate, Generate Swap Sequence, and Save.



"Edit" Context Menu Command

Selecting Edit from the context menu brings up the Edit Material dialog. The following controls can be found in this dialog:

Solid Color

Use this pop-up menu to choose a color for this material. The list contains colors already used in the model, and "Choose…" to add a new color. You'll note that the colors in the pop-up menu are designated in "hex" values. Hex values are often used in HTML coding to define colors. If you select "Choose…" the color picker will display the colors in both hex values and RGB.

Texture Image

Choose an image for this material. The list contains image files already used in the model, and "Import…" to add a new image. Note that only JPG, GIF, and PNG image formats are supported.

Shader

Choosing "None" will show textures and colors exactly as they appear, with no lighting effect. This is sometimes called "Self-illuminated" lighting. The "Phong" shader allows the use of artificial lighting effects to improve realism for non-photographic textures and solid colors.

Ambient Intensity

For the Phong shader, this controls the influence ambient light has on the material (global ambient light intensity is multiplied by this factor).

Diffuse Intensity

For the Phong shader, this controls the influence that directional light has on the material (each directional light intensity is multiplied by this factor, as well as by a factor based on the angle between the light and the surface).

Specular Intensity

For the Phong shader, this controls the influence that directional lights have on the specular highlights shown on the material. Specular highlights can be thought of as reflections of the light source. Specular highlights are always white, and not only add white to the surface, but also reduce material transparency. Note that specular intensity and glossiness together control the size of specular highlights.

Chrome Effect

For the Phong shader, this effect makes materials look like metal or glass, instead of plastic.

Glossiness
For the Phong shader, this controls the size of specular highlights. Numbers approaching 1 will lead to smaller/sharper highlights. Note that surface normals are critical to these calculations: completely flat surfaces will never have specular reflections. For flat surfaces, a glossy surface will reflect light over a smaller range of angles than a less glossy one. Note that if Specular Intensity is set to zero Glossiness will have no apparent effect.

Alpha
This controls material alpha level (0 is transparent, 1 is opaque). Note that this attribute can be animated by a sequence.

Backfaces
Triangles that face away from the camera can be culled or displayed, depending on the setting of this control. In general, performance will be better with backfaces hidden.

UV Wrapping
For triangles with materials containing texture maps, UV coordinates approaching or exceeding the standard 0 to 1 range, this controls the display of texture beyond those coordinate values. Wrapping means to take the pixel from the opposite side of the texture, and not wrapping means to use the last pixel repeatedly. Note that this can be relevant even for materials which are mapped to exactly the 0 to 1 range, since texture coordinates are assumed to be on pixel centers, so anti-aliased pixels may reach slightly beyond the maximum vertex texture coordinate value.

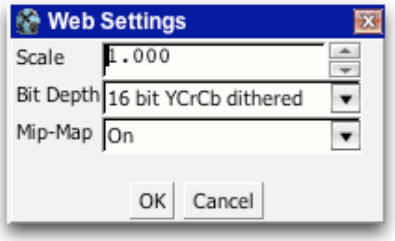
Composite
This controls the manner in which this material's color values are rendered into the scene, similar to the way Photoshop layers can be combined. Use additive compositing for effects like fire, lens flare, or point lights. Use the "Multiply" setting for compositing effects like smoke or shadow masks.

Library Save and Load Buttons
These two buttons allow you to work with a Materials Library. Click on the **Load button** and the **Open dialog** appears. This dialog defaults to opening to the Materials folder that is located in your Strata Live 3D CX 2 install folder. You'll note that Live 3D ships with a number of pre-made materials for you to use.

The Save button allows you to save your material creations. The Save dialog defaults to the Materials folder location as well.

"Web Settings" Context Menu Command

This command (accessed by right-clicking on a material name from the Materials palette) is available for materials with textures. The command brings up the **Web Settings** dialog, which controls the way the texture map is stored in web tour applications.



Scale

This allows you to scale down the texture for use in web applications. Smaller numbers create a smaller texture map – the image will actually be smaller in pixel dimensions when saved out as a web Product Tour.

Bit Depth

This allows you to control the way each pixel is stored. 32 bit ARGB is required for materials that have a per-pixel alpha channel. 24 bit RGB retains exact true color for materials with no alpha channel. It is extremely unlikely that you will need to use this format. The two 16 bit YCrCb formats represent color with 8 bits of intensity per pixel, and 16 bits of chrominance spread over pairs of pixels (analogous to JPEG "422" encoding). Optionally, the 16 bit formats can use an error-diffusion dither to conceal any color detail lost in color averaging process.

MIP-Map

When using textures that are high resolution, MIP-maps will pre-sample the texture at lower resolution to avoid "sparkle" in the texture as the object moves. This can be disabled, enabled, or enabled-with-blur. The blur option biases selection of MIP level toward lower resolution, and can be used to aggressively combat Moiré patterns that appear in some textures with repeating patterns (ventilation grills, for example).

"Add Alternate" Context Menu Command

This command turns the present material into a multi-state material, as might be used to show different video screens, or for a script that offers viewer selectable material changes. Adding an alternate material also creates a sequence which controls which material is displayed. This sequence can then be accessed by any scripts you create.

For additional tips on how to use materials, see section 4.2, Working With Materials, Textures and Shaders, below.

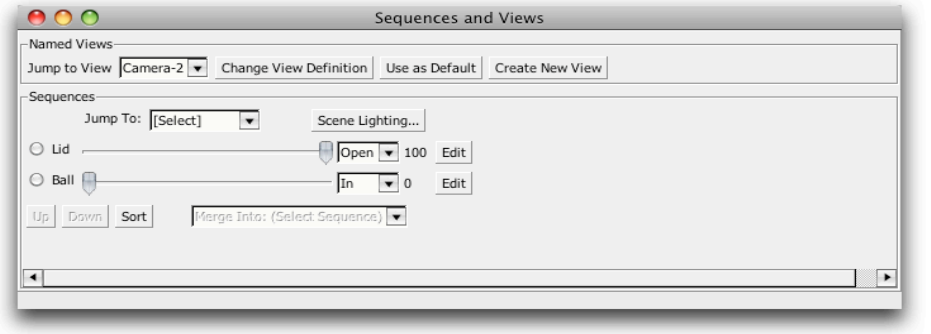
"Generate Swap Sequence" Context Menu Command
This command generates a new controlling sequence for a swap material. You can animate the appearance of an object by swapping what material is used on a surface. For example, if you have a model of a cell phone, you can use a swap material to animate what appears on the screen.

In certain circumstances you can end up with a swap material that has no controlling sequence. For example, deleting a sequence, or copying and pasting materials between models can both cause this to happen.

Sequences and Views Palette

This palette is used to manipulate and edit sequences and named views, as well as scene orientation and lighting. For a more detailed description of how sequences and views are used for interactive animations, see Chapter 4, The Workflow, and Chapter 5, Live 3D Tutorials.

> **NOTE:** *Simply manipulating the state of a sequence, scene orientation, or lighting using this palette will not have a permanent effect on the model. The initial state of the Master Model is controlled exclusively through the initialization script, which you edit with the Scripts palette. Edits that you make to sequences and views, however, do remain permanent. These sequences and views can then be utilized for the creation of scripts.*



Named Views Section
The Named Views section can be found across the top of the Sequences and Views palette.

To ensure consistency in the user experience, and to accelerate script authoring, it's a good idea to create named views of a model. A view fully defines the camera placement and behavior such as min/max zoom. Select a named view from the menu at the top-left of this palette (in the Named Views section of the palette) to jump to an existing named view.

Change View Definition Button and Edit Camera Dialog

Once a view is selected in the Jump to View pop-up menu, you can edit it using this button. The Edit Camera dialog comes up.

Basic Tab

The basic tab contains the controls to rename the view, jump to the settings of another named view, move the view pane closer or farther away, and align the view horizontally and vertically.

Detail Tab

This tab provides controls to zoom in and out by changing the lens, adjusting the orientation angle of the view, and panning the view left/right and up/down.

Limits Tab

This tab allows you to set limits on how far a user or script can zoom the view or change the elevation angle.

Advanced Tab

This tab allows you to set up the target point for the view.

Use As Default Button

Views used by scripts usually get many of their parameters from the defaults stored in the Master Model. These defaults typically match the values used by

the view in the Init script, which is typically a named view called Init or Initial. After selecting a view, you can change the Master Model view defaults to instead use the values from the selected view. Any view that was using the old defaults will start using these defaults instead. This is useful, for example, to globally increase camera distances.

Create New View

This button creates a new named view, and launches the Edit Camera dialog.

Deleting A View

There is currently no facility to delete a view, other than the Edit > XML menu item.

Sequences Section

The Sequences section of the Sequences and Views palette takes up the majority of the space in order to make room for multiple sequence sliders. Sequences can be thought of as animation and interactivity building blocks. Sequences and views are used by the Scripting palette to create animation scripts.

You can create a new sequence by using the menu command **Insert > Sequence...** from the main menu bar.

Jump To Menu

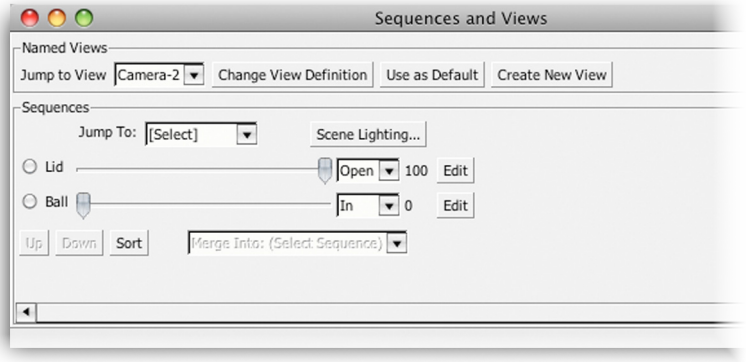
The Jump To menu allows you to select a previously made bookmark. A bookmark is a combination of a script and a time value, which together describe the state of several sequences, and possibly the camera. All bookmarks are listed in this Jump To menu, and selecting one sets all the sequences to their bookmarked values.

Scene Lighting Button

Use this button to change scene lighting (only existing lights can be edited; to add new lights, use the **Insert > Light** command from the main menu bar). The actual Scene Lighting editing interface will appear overlaid on the 3D View palette.

Sequence Controls

Each sequence can be manipulated directly using the controls in this list. Note that the current sequence state can also be manipulated in the 3D View palette using the right mouse button to gain access to the Sequence Disc controller.



Sequence Radio Button

The radio button, just to the left of the sequence name, is used to select a sequence for special editing. You can use the Up and Down buttons to change the order, or "sort", the selected sequence. You also have the option of merging sequences by using the Merge Into pop-up menu.

Sequence Slider

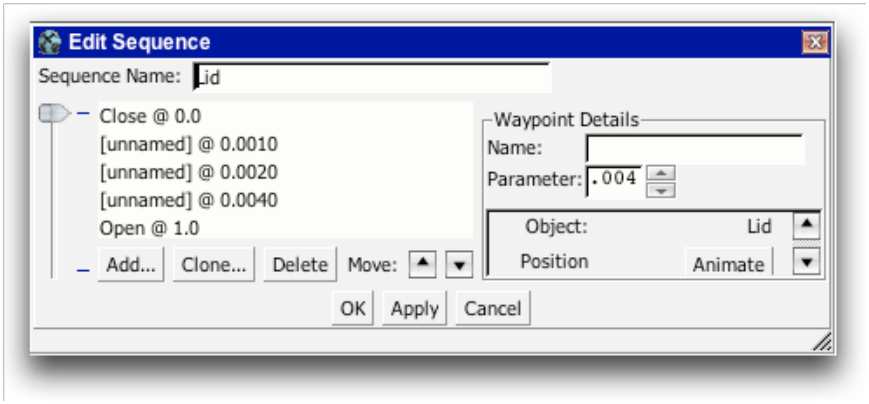
Each sequence will have a slider controller associated with it. As you drag this slider you will see the object go through the waypoints currently created for the sequence.

Jump To Named Waypoint Pop-Up Menu

For sequences that have named waypoints there will be a pop-up menu to the right of the slider. You can use this pop-up menu to select a named waypoint and the slider will jump to that point in the sequence.

Edit Button

Click the Edit button to the right of a slider to edit the sequence. The Edit Sequence dialog will appear containing a list of existing waypoints for the sequence. A waypoint is similar in concept to a keyframe. Selecting a waypoint from the list allows changing its name, parameter value, and all of the waypoint's effects in the Waypoint Details section on the right side of the dialog.

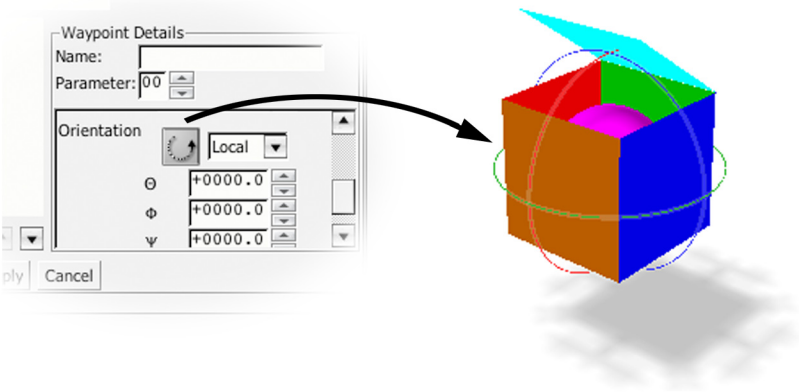


You can edit two different types of sequences: object animation sequences, and material animation sequences.

Simple object sequences operate on a **single object** in the scene, and can affect the object's position, orientation, location of the pivot, and the object's opacity. When a waypoint of an object sequence is selected, the controls for animating the object's attributes appear below the waypoint's name in the Waypoint Details section of the palette. For already animated attributes, their current values are displayed and can be edited. For those attributes that are not yet animated, an **Animate** button is displayed.

Once an attribute is set to animate, you can edit the its values by typing in new values. Additionally, for Position, Pivot and Orientation attributes, interactive manipulators are available. Pressing the **manipulator icon** next to the corresponding attribute displays the manipulator in the 3D View palette.

The manipulator can be oriented in the object's local, object's parent, or the world coordinate system by making the selection in the pop-up menu, which appears in the Waypoint Details section of the dialog when the manipulator is engaged. Clicking the manipulator icon for the **second** time enlarges the size of the manipulator in the 3D View, making it easier to use with certain objects. Clicking it for the **third** time turns it off.



To use any of the manipulators, first engage one of them by pressing the icon, then click on the manipulator in the **3D View**, and drag with the mouse to move or rotate the object or its pivot.

Simple **material sequences** can animate the **material alpha**, and apply a **color curve filter** to the material. To specify a set of materials to animate, you can press the **Select...** button and select the desired materials from the list. To animate the alpha value of the selected set of materials, first click the corresponding **Animate button**, and then type in the alpha value desired for the current waypoint. To apply an animated color curve to a set of materials, click its Animate button, and then click the Edit… button to open the curve editor.

Sorting

The order in which sequences are listed can be important for usability. In particular, it controls the order in which tracks appear in the Script palette. Sequences should be grouped by the parts on which they operate. For very large models with many sequences, it is helpful to further group sequences by where they appear on the 3D model. For example, you might want to group sequences that operate on the front of the model together, then group sequences that operate on the back of the model together.

To change the order of sequences, click the radio button next to the sequence you want to move. Then use the **Up** and **Down** buttons at the bottom of the palette to change the sequence order. Click on the **Sort** button to sort the sequences alphabetically.

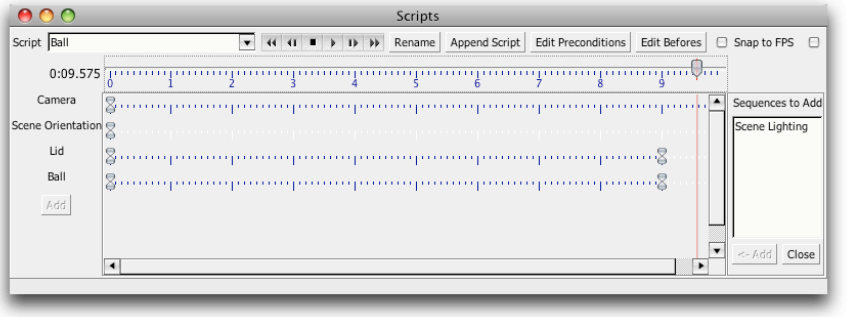
Merging

When two objects must work in concert with one another, it is often convenient to merge their sequences. While the runtime system can deal with sequences that have differing waypoints, it is strongly recommended that all waypoints in all sequences that are merged match exactly in both parameter value and ID. In practice, this means it is safe to merge simple two point sequences, such as Fade sequences. Merging more complex sequences should be followed up with the use of **Edit > XML** to ensure the waypoints of the various sub-sequences correspond.

To merge sequences, choose the sequence that you wish to become a sub-sequence by clicking on its radio button, then choose the new parent sequence from the **Merge Into** pop-up menu at the bottom of the palette.

Scripts Palette

A script controls the animation of sequence state – and optionally camera, lighting, and scene orientation – over time. This control takes the form of an "**event marker**" – a designation of a "state" at a given time. The animation state between event markers interpolates the event marker values. The script editor organizes these event markers into "**tracks**." There is one track for each sequence used by the script, and optionally tracks for camera motion, scene lighting, and scene orientation.

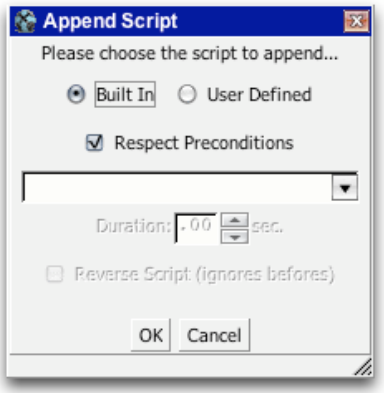


Every Master Model has an **initialization script**. This special script must set the state of every sequence, the camera, lighting, and scene orientation. Failure to include a sequence in the initialization script will lead to **unexpected results**: the object will start in whatever state it happened to be in when last saved.

To add a new script to the scene, use the **Insert > Script...** menu command. This will open the Scripts palette, and activate the Append Script dialog. You

can select an existing script to use as the starting point of this script, or choose Cancel to instead define the script using tracks. This section describes each of the functions of the Scripts palette.

Append Script
The Append Script dialog allows you to create a new script by basing it off of an existing script. This approach is most commonly used to create reverse scripts. Ordinarily, only scripts that make sense given the current state of the model are listed. To see the list of **all** scripts, uncheck the Respect Preconditions box.



Generally, scripts are created in pairs. One script does something (for example, "Box Open") and the other undoes it ("Box Close"). To facilitate this, you can choose an existing script, and then select **Reverse Script**. The new script will contain the same event markers as the original, except time is reversed. Also, heuristics are applied to guess the right preconditions and even the name of the reverse script. These can, of course, be edited as needed.

Anytime you create a new script the Append Script dialog is presented.

Add Track
This function is accessed through the list on the right side of the Scripts palette. If the track window is closed, you can open it again using the **Add** button that appears on the left of the dialog. Using this field, you can add any track to the script. Available tracks are:

Camera: This track controls the viewing direction, position, and magnification of the view while the track is running. Note that in web Product Tours, which run with a variable frame rate, all camera motion is smoothed, to avoid sudden changes. This smoothing is, by default, much slower while scripts are

running than the smoothing applied when the user is interacting with the 3D model. To avoid a sudden camera snap at the end of a script, it is a good idea to avoid having any camera moves during the last second of a script, to give the viewpoint a chance to settle. The final camera event marker in a script also defines the user interface thereafter in a web product tour: center of rotation, limits on zoom, min and max elevation angle, etc.

Scene Lighting: This track controls the position and intensity of the lights in the scene. To add more lights to the scene, use the **Insert > Light** menu item. Each light in the scene will lower the update rate slightly, so avoid using more lights than absolutely necessary.

Scene Orientation: If you think of the 3D scene as a photo studio, this track controls how the product being viewed is placed on the table. It is extremely rare that you will need to adjust the scene orientation, since the camera can be moved in a wide variety of ways. However, when the need arises, this track can be used.

Sequences: The remaining tracks listed in the Add Track field correspond to sequences that have not yet been used in the current script. These might include sequences you've created or ones that were imported with your model file.

Timeline & Track Editing

At the top of the Scripts palette is a timeline for the script. Below the timeline are the individual sequences that make up the script. Right-clicking on the timeline, or on a sequence, brings up a menu of available operations:

Edit

This option is available if you right-click on an event marker. Select it to open the editor for this event marker. Note that double-clicking the event marker has the same effect.

Set To >

Allows quickly setting a camera event marker using a named view, or setting a sequence event marker using a named waypoint.

Copy

Copies the selected event marker.

Paste

Pastes a copied event marker. Note that you can copy and paste event markers between scripts.

Delete
When clicking on an event marker, this command deletes that event marker. On the track, this deletes the entire track. Note that intermediate event markers can be quickly removed by dragging them off the track.

Insert Time
Inserts more time into the script at the point where you clicked the mouse. Everything to the right of this point will slide to the right.

Delete Time
Deletes time from the script at the point where you clicked the mouse. Any event markers to the right of this point will slide to the left.

Change Duration
Changes the overall duration of the script by moving all event markers proportionally along the timeline. You can use this option to effectively make the script play faster or slower.

Add Time to End
Adds one second to the end of the script. Note that clicking the + button at the top-right of the palette, or on the 3D Remote (described below) has the same effect.

Track Editing
In addition to the right-click menu commands outlined above, you can also edit individual tracks with the following options:

- Each event marker on the track can be dragged to a different time in the script, or dragged all the way off the track to delete it (except the first and last event markers, which can only be dragged).
- Double-clicking on an event marker brings up the editor for that event marker.
- Double-clicking on the track adds an event marker and brings up the editor.

Major time intervals (seconds and integral fractions of seconds) have “gravity” when editing: clicking or dragging near those points will snap to them. To temporarily disable this gravity, hold down the **Ctrl key**.

To add more time to the end of the script, use the **“ + ” button** at the top-right of the palette. Each click adds one second. Typical use is to make plenty of room for the script, and then when all the editing is finished, use the **“ – ” button** to trim any excess time to the right of the last event marker.

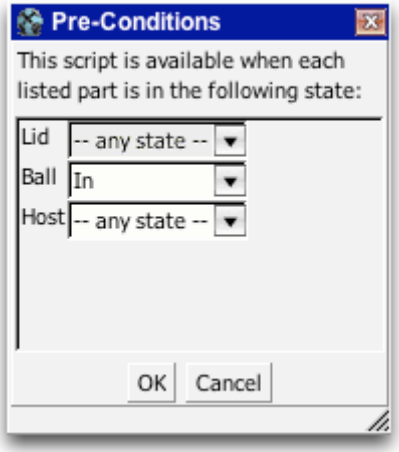
3D Remote Control

When the Scripts palette is showing, a "remote control" appears in the 3D View palette. With this control, you can perform several of the functions available in the Scripts palette. Float your cursor over the buttons on the remote control to see text descriptions of their functions.

When you manipulate the **state** of an object, in the 3D View palette using the right-click **Sequence Disc** pop-up function, event markers are automatically added at the current time in the script being edited. To add a camera event marker, use the camera button on the remote control.

Preconditions

Preconditions specify things that must be true in order for it to make sense to use this script. For example, a Box Open script would have Box Closed as its precondition. This way, the user is not presented with a Box Open button to choose when the Box is already open. By setting up preconditions correctly, Product Tour interfaces can be consolidated. For example, the Box Open and Box Close scripts, being mutually exclusive by their preconditions, can be assigned to a single “Box” button, which opens or closes the Box, depending on its current state.



Click the **Edit Preconditions** button at the top of the Scripts palette. In this dialog you can select the state that any sequence must be in, in order for the current script to make sense to run.

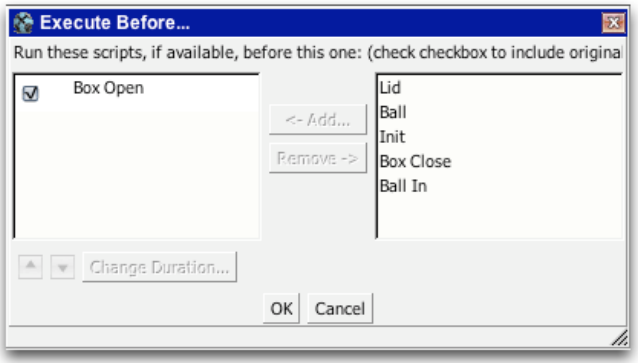
You can float your cursor over the Edit Preconditions button to see a **tooltip** with the list of preconditions currently being used by this script.

Befores
Befores are references to other scripts, which **need to run before** this script. For example, a Box Open script might have a Lock Open script as a Before. When the user chooses the Box Open animation from the Product Tour, the Lock Open script will run first.

A good rule of thumb is:

Preconditions are about **this** object

Befores are about **other** objects



Click the **Edit Befores** button. In this dialog you can select which scripts need to run before the current script, adjust the order in which they run, and the rate at which they execute.

The **checkbox** next to the script name allows you to include or exclude the camera track. You can float your cursor over the Edit Befores button to see a **tooltip** with the list of Befores currently being referenced by this script.

For a more detailed description of how scripts are used for interactive animations, see Chapter 4, The Workflow, and Chapter 5, Live 3D Tutorials, below.

Preview Scripts Palette

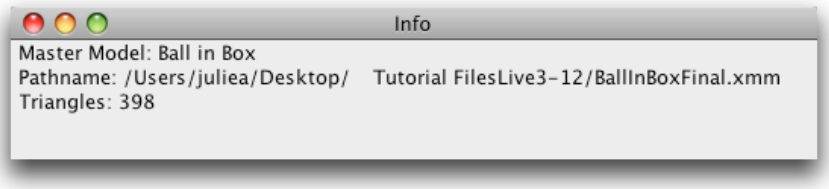
Each button on this palette triggers execution of a script in the Master Model. You can only execute one script at a time using this palette.

Preview Compression Palette

This palette mirrors the 3D View palette, but shows the compressed version of the model. Note that compressing the Master Model to web resolution can take several minutes, and this will happen when you open this palette. Also, this palette should not be used until all sequence and script editing is finished. Edits to sequences or scripts will not necessarily be reflected into this version of the model. To edit sequences, close this palette, make the changes, then open this palette again (and get a cup of coffee while the model is re-compressed).

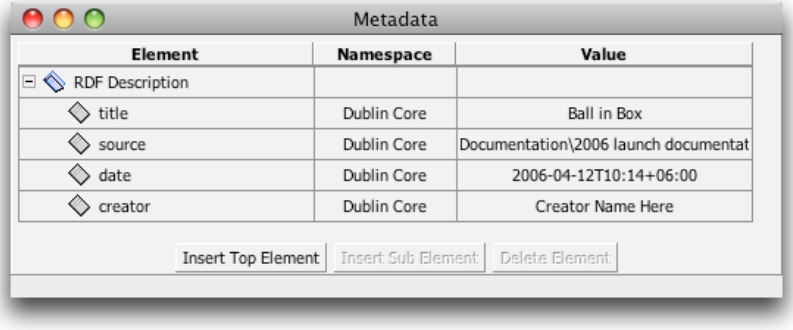
Info Palette

This palette shows information about the XMM file being edited. You can access useful information from the Info palette, such as the overall polygon count of your model.



Metadata Palette

This palette is used to edit information about the model. Note that no changes to the text values take effect until you hit the Enter key.



Log Palette

This palette lists messages generated as you perform editing operations. The buttons at the top of the palette can be used to filter the information displayed. Use the View Log File button to open the detailed log file, where even more progress messages can be found, along with details of any errors that occur.

Chapter 4

The Workflow

Introduction: The Workflow Process

In a typical project you will develop or locate your 3D model, import it into Strata Live 3D CX 2, "clean-up" the model to make it more efficient for live presentations, perfect your materials, setup your lighting, create your views – and then script your interactivity. This chapter is laid out to follow this approximate workflow progression.

4.1 Making Efficient Models

Developing 3D models for real-time applications creates some unique challenges. Whether you develop your own models for a given project or you get them from a client, co-worker or model library, there can be many issues to think about.

Strata Live 3D CX 2 does a lot of this thinking for you by automatically dealing with the three key areas of optimization: decimation, compression and streaming. More detail on the proprietary ways in which Live 3D automatically deals with these issues can be found in the Appendix of this User Guide. This section will only present the areas that may require some input from you to ensure the highest quality model at the smallest possible size.

Optimizing the Original Model

If your model was created for some other purpose – such as manufacturing, high resolution illustration, or movie special effects – you'll find that there will likely be extra polygons, objects and high resolution texture maps that aren't necessary for your Live 3D presentation. If possible, you'll want to clean up or remove some of these objects prior to exporting the model for use in Live 3D. Some of the issues of concern include:

- Small Details (nuts, bolts, etc.)
- Hidden & Unused Details (internal machinery, components, etc.)
- Fine Details (high polygon count representation of surfaces)
- High Resolution Textures (images that are meant for very close examination in the original model but may not see such scrutiny in your Live 3D presentation)

If you don't have access to the original modeling application, or you've done all you can within that application to simplify the model, Live 3D provides some very powerful technologies to improve the situation. As mentioned, many are automatic and done in the background. You have full control over two of the most important tools: Level of Detail and Texture Map optimization:

Using Level of Detail (LOD)

Live 3D includes a very powerful polygon decimation, or reduction, technology that allows you to reduce the polygon count of any object while maintaining the overall shape. This technology is accessed through the Level of Detail dialog.

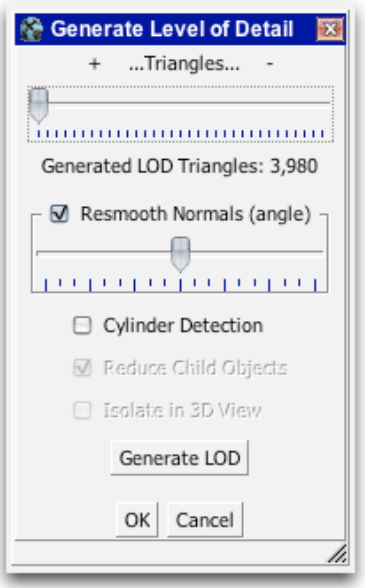
The Level of Detail dialog is accessed by right-clicking on the object's name in the hierarchy on the main Live 3D palette and then selecting the **Generate LOD** command from the contextual menu. All the functions of this dialog are outlined in detail in the Live 3D Main Palette section of Chapter 3, The Workspace.

Once you've created a reduced polygon LOD for your model, Live 3D will use this representation of the object for all exported Product Tours and Walk-throughs.

Generating an LOD Model

There are two basic approaches to generating lower levels of polygons for you model using LOD: **Selectively reducing** portions of your model, or; **Reduce all** of the parts of your model, then selectively "**up-res**", or increase the resolution of selected parts of the model that need greater detail.

For complex models it may be easier to use the **reduce all** approach. To do this, select the top element in the hierarchy view of the main Live 3D palette (this will typically be the name of the model that you have imported into Live 3D) and right-click on the object name. This will bring up the contextual menu. Select "Generate LOD". The **Generate Level of Detail dialog** will appear.



In the dialog, drag the **Triangles** slider to the far right. Now click on the **Generate LOD button**. A progress dialog will appear showing the progress and displaying the number of polygon reduction in the title bar of the **progress dialog**. When you look at your model in the 3D View palette you may be able to see the affect of the reduction of polygons.

To selectively adjust the LOD for your model – whether to "up-res" portions after using the **reduce all** approach, or to **selectively reduce** the detail of particular sections – you simply select the object in your model that you want to adjust and use the Generate LOD command from the contextual menu. You can select parts of your model directly in the 3D View palette by holding down the Shift key and clicking on the object you want to select, or you can use the hierarchical view to select the object directly by name. Either way, once the object is selected, it will appear shaded in red (both in the 3D View and in the Hierarchical view). Right-click on the selected name in the main palette and select Generate LOD. Adjust the LOD to a desired level for the object.

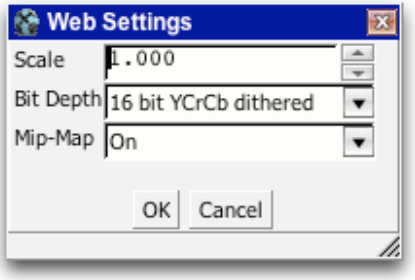
The reduction of polygons is non-destructive – meaning that detail is not actually lost, Live 3D just provides this lower level of detail as an alternative view of the model which is then used for Export operations.

To see the individual polygons (and the explicit result of your LOD generation), select **View > Wireframe > On** from the main menu. The model will now

show the wireframe of the polygons overlaid on your model. You can compare the full polygon structure of your model to the reduced version by selecting **View > Level of Detail > Highest**. Your model will now display the original level of polygon detail. **Select View > Level of Detail > Lowest** to return to the reduced LOD.

Using Web Settings for Material Optimization

You can directly optimize texture maps for web and other Product Tour projects. To access these settings, open the **Materials palette** and then right-click on any material that contains a texture map. You will see a context menu with three commands: Edit, Web Settings and Add Alternate. We will only concern ourselves with **Web Settings** in this part of the User Guide. For a detailed explanation of all three of these commands, see the Materials Palette section above.



> **NOTE:** *If the Web Settings command is grayed out when right-clicking on a material name it is because there is no texture map contained in that material. Web Settings only apply to texture maps.*

On selecting the Web Settings command from the context menu the **Web Settings dialog** will be displayed. This dialog offers three areas of control: **Scale**, **Bit Depth** and **MIP-Map**.

Texture Map Scale

The texture map scale is a relative setting. What this means is that if you keep the starting setting of 1.000 as the scale, the texture image map will be output for your web Product Tour at the same size that it is currently. If you input a scale setting of 0.500 the map will be reduced in size by 50% horizontally and 50% vertically – which is actually 25% of the original size (because the effective size of the image is equal to splitting the image 50% from the top and 50% from the side – the size is equal to one of those four pieces left from these splits – the image is then sized down to fit that new dimension).

As you can see from the above description, reducing the size of the map scale has a large effect on the overall size of the image. To determine what setting is best for your project, think in these terms:

- How important is the detail in this particular texture map?
- How close will the viewer ever get to the surface the material is applied to?
- If the texture map were to appear "fuzzy" on the few occasions the viewer does get close, how big a detriment is that?

Once you can answer these types of questions you are ready to choose a setting for the texture map scale.

Texture Map Bit Depth

The important thing for "**Bit Depth**" is that you want to go as low as you can. Typically the most efficient setting will be 16 bit YCrCb with dithering. Similar to selecting a texture map scale, for bit depth you want to make a qualitative judgment about how the texture will be seen by the end viewer of the presentation. Issues to consider are these:

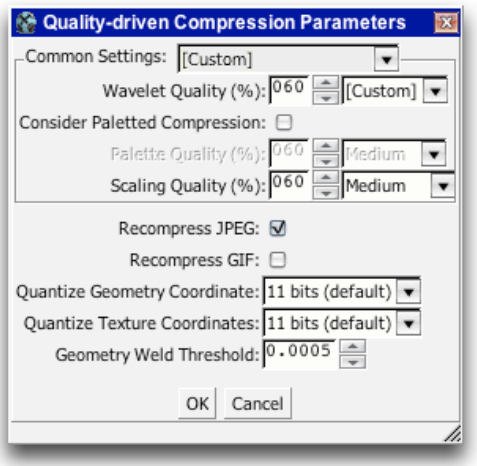
- Does the texture map include an alpha channel? If yes, is that alpha channel truly important to the material? If yes again, you need to use 32 bit ARGB to maintain the alpha channel on output.
- Is the texture photo-based and does that photograph use a wide range of colors? If yes, how important is it to maintain that true color fidelity for this presentation? If you feel it is important, and there is no alpha channel involved, then you may want to use 24 bit RGB.
- If you feel the texture can be satisfactorily displayed in 16 bit color, you'll want to choose between dithered and non-dithered. In almost all cases you'll want to utilize the dithered option. Dithering is a process of mixing individual colored pixels from a limited palette of colors, and into a loose pattern, to gain the illusion of a wider color spectrum. The only time you may want to use "undithered" would be when you expect the viewer to magnify the model to the point where the dithering becomes more of a distraction than a help.

Texture MIP-Mapping

Though this setting has more to do with avoiding Moiré patterns on large textures, it can be a useful tool for optimization in this sense: When you do decide to reduce the resolution of some of your texture maps, you'll want to make sure that any high resolution texture maps work well – and are worth the size commitment you make. Additional tips on maximizing your use of textures can be found later in this chapter.

Setting Compression Parameters

Overall compression parameters can be accessed by selecting the menu command **Edit > Compression Parameters** from the main menu. This command brings up the **Quality-driven Compression Parameters** dialog.



As the name implies, compression in Live 3D is quality-driven, meaning that the system attempts to meet a quality goal and is not tightly constrained by specific parameters you input.

The **Common Settings** cluster of options deals with wavelet compression parameters, which are used for image compression. This can be a very complex process and so we recommend you use the Custom Settings pop-up menu at the top of this section of the dialog.

Wavelet compression is similar to JPEG in some regards. Wavelet produces superior results relative to JPEG, providing smaller file sizes and better image quality. Wavelet is especially good for photo-based texture maps.

If you turn on the **Paletted Compression** checkbox you allow the wavelet compression to take into account a reduced palette, similar to the way GIF compression works.

The **Recompress JPEG** and **GIF** checkboxes allow the wavelet compressor to **recompress images** that may already have been compressed by you before you brought them into the model. If you have the option, it is best to bring in the highest quality images you can into the model. This allows the wavelet compressor a better starting point to work from to compress the images.

The two "**Quantize**" menus allow you to set the desired bit depth for coordinate accuracy – the lower the number the better the compression. You do run the risk of rendering anomalies in the final exported Product Tour, so make sure you fully test your final work.

The **Geometry Weld Threshold** field lets you set the system tolerance where two vertices will be "welded" together. The higher the number, the more vertices will be combined into one vertex – and the more the model will compress. However, as with all compression techniques, you do run the risk of quality degradation and/or rendering anomalies.

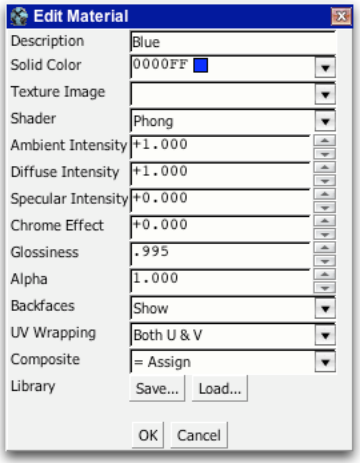
Use the **Windows > Preview Compression** command from the main menu to preview the compression techniques you've learned from this section.

4.2 Working with Materials, Textures and Shaders

In Live 3D, imported objects will typically have some material or texture already applied to them. Often, these imported textures and materials don't take full advantage of the real-time effects possible in Live 3D. In this section we'll discuss how you can add these effects to your materials.

To edit these existing materials, open the Materials palette. You can open the Materials palette in a couple of ways. You can select **Windows > Materials** from the menu bar or you can **click** on the object while holding down the **Ctrl key**.

The Materials palette displays all the materials which are applied to the objects in your model. Materials are shown by name in a hierarchical view under the name of the object they are applied to. To edit an individual material, **right-click on the material name** and select **Edit**. This will bring up the Edit Material dialog.



The individual controls in the Edit Material dialog are outlined in detail in the Materials Palette section in Chapter 3. Rather than detail each of those controls here, we'll instead discuss strategies for getting the desired look for particular materials.

Getting the Right Look

One easy way to get the right look for your objects is to take advantage of the **Materials Library** that ships with Live 3D. These can be accessed from the Edit Material dialog using the **Load button** near the bottom of the dialog. To understand how to create your own effects and what some of the materials settings can do for you, read on.

Chrome

You can add a "chrome effect" to any material by editing it in the Edit Material dialog and using the "**Chrome Effect**" field. You can edit this field (and all fields in this dialog) in three ways: by directly entering a number, clicking on the up and down scroller arrows or by clicking and dragging up or down on one of the scroller arrows. As you drag on a scroller arrow you will see the numbers go up or down proportionately.

While adding the Chrome Effect you will notice a couple of things. First is that the **Specular Intensity** field matches the numerical changes of the Chrome Effect field. This is set up this way because Specular Intensity has a direct affect on the Chrome Effect. Specular Intensity does just what the name implies – it affects the intensity, or brightness, of the specular intensity. You can directly edit the Specular Intensity to change its proportional relationship to the

Chrome Effect field. Make sure you watch the change in effect of these settings in the 3D View palette to ensure you get the desired result.

Another thing you will notice is that changing the "**Glossiness**" setting will have an affect on how the Chrome Effect works on the surface. The higher the number, the tighter (and likely smaller) the specular highlights will be. Tight, bright specular highlights typically indicate a highly polished surface.

Playing with all three of these settings – Chrome Effect, Specular Intensity and Glossiness – provides total control over this effect.

Glass

To create a glass effect you need to alter several settings in the Edit Material dialog box. Readers who use 3D rendering software will find these issues to be familiar. You need to decrease opacity (referred to as **Alpha** in the Live 3D Edit Material dialog). That's plain enough. But in order to achieve an appearance of a glass-like material you need to modify a couple of other settings as well.

To look like glass, a material must have a **lowered Alpha** (to provide transparency as previously stated), **lowered Diffuse Intensity** (more of the surface's light contribution should be coming from the background via transparency and less from diffuse light reflecting the surface colors), **increased Glossiness** (you expect a glass surface to be somewhat glossy) and **increased Specular** Intensity (glass surfaces tend to be more polished than "frosted"). When you adjust this combination of settings you can begin to get a convincing glass surface.

Basic Settings *Gloss & Specular* *PNG Map for Transp.*

Using Alpha/Stencil Maps

Live 3D supports using **per-pixel alpha** transparency in textures (also known as Stencil maps in Strata Design 3D CX). This can be useful, for example, for creating ventilation grills without using excessive geometry. These are the steps to follow:

Create your color image map with an alpha mask and save as a **PNG** file. PNG is currently the only file format supported by Live 3D that will read in the alpha transparency information. To create a PNG with alpha transparency using **Adobe Photoshop**:

a. Use the "Add Layer Mask" button on the bottom of Photoshop's Layers palette.

b. Paint the transparent areas in the mask. Any dark paint in the new mask will create areas of transparency.

Once you have the layer mask defining areas of transparency, choose "**Save As...**" from Photoshop's **Edit** menu. The Save As… dialog will appear. From there select PNG from the Format pop-up menu and then save the file.

1. Next, Open or Import the model into Live 3D on which you wish to use the texture map with alpha transparency.

Open the Materials palette by selecting **Windows > Materials** from the main menu.

Find the material applied to the object and right-click on the name. From the pop-up context menu select "Edit…" This will open the **Edit Material** dialog.

From the **Texture Image** pop-up menu select "**Import...**" Find the PNG image using the Open dialog and open it. It will now be loaded into the Texture

Image channel of the Material. In the 3D View palette you should see areas of transparency on your object.

2. Make any other adjustments you'd like to make on the material and then click on the OK button.

3. From the Materials palette, right-click on the material name again, but this time select "Web Settings..." from the menu. The Web Settings dialog will appear. For "Bit Depth", select "32 bit ARGB". This tells the 3D View palette that you want to use Alpha channels for your export, so a full 32 bit color representation is required.

> **NOTE:** *If you're using alpha transparency for a ventilation grill or other repeating pattern, it might be a good idea to set the MIP-map setting to "On with Blur" as well while you're in the Web Settings dialog. This setting forces the MIP-level selector to bias toward the lower resolution texture, which can help reduce Moiré patterns.*

Pixel-level alpha transparency is in addition to the overall material level alpha transparency (which you can also change in the Edit Material dialog using the "Alpha" numerical setting – or you can animate transparency with a sequence). And both of these are in addition to Object-level alpha, which you can expose simply by making an object public (right-click the object in the hierarchy view and use the menu items).

> **PERFORMANCE NOTE:** *Using alpha channels of any kind requires that the rendering be sorted for every scene, to ensure parts layer correctly. This can slow update rate for very large scenes, so use alpha channels only when needed.*

Natural Surfaces

One of the best ways to get natural looking materials is to utilize actual photographs for your texture maps. Photos with lighting already "**baked in**" help to show features such as bumps, dimples, cracks, etc. This is one of the reasons that Strata Foto 3D CX is ideal for creating models for Live 3D – the surfaces are based on actual photographs of the object.

An ideal baked-in texture will be one that was originally shaded as if wrapped around the object you're applying the texture map to. In our Saber Dino tutorial model, the texture map for this (and the geometry for that matter) came from Strata Foto 3D CX. This means that the belly portion of the texture map (for example) is shaded a bit darker than the top of the Dino's back.

When using these "**pre-lit**" texture maps you very well may want to let the existing lighting of the map shade the object. To let this existing map lighting

show through you'll need to **turn off local lighting** from any light sources that may be in your model. You can do this for the entire model and all materials that are applied to all surfaces, or you can selectively turn off this lighting on a material by material basis.

To turn off lighting for all materials, go to the main menu and select **Edit > Change All Materials > Light None**. You will see an immediate change in the lighting of your surfaces. To change the lighting for selected materials, hold down the Ctrl key and click on the surface that you want to turn off lighting for. The Materials palette will come up with the clicked-on material selected. Right-click on the selected material and select Edit from the pop-up menu. In the Edit Material dialog, **Shader field, select None** from the pop-up menu to the right. The Phong shader calculates the effect of the local lights. Turning off Phong will let the baked-in lighting fully show through.

Animating Materials

Details on the process of creating animation scripts in Live 3D can be found below in Creating Basic Interactivity. In a nutshell, to create animation scripts, you first create a "**sequence**", then utilize one or more sequences to develop a script.

To create an animating material sequence, choose **Insert > Sequence** from the main menu. The **Insert Sequence** dialog appears and from there you select the **Material sequence** radio button. Once you click OK, the **Edit Sequence** dialog appears and you're given the option to animate the Alpha and/or a color Curve for the materials you select.

To specify a set of materials to animate, you press the **Select...** button and select the desired materials from the list. To animate the alpha value of the selected set of materials, first click the corresponding **Animate button**, and then type in the alpha value desired for the current waypoint. To apply an animated color curve to a set of materials, click its Animate button, and then click the Edit… button to open the curve editor.

Once your sequences are created, you're ready to build the scripts. As mentioned, this process is similar, whether you're scripting a lid opening or a material fading. Just follow the process outlined in Creating Basic Interactivity to learn more.

4.3 Working with Lighting

There are basically two key aspects that affect your lighting: **emitted light** and **reflected light**. In Live 3D, light sources emit light to illuminate the scene. How that light effects the surfaces is controlled by the material applied to the surface.

Light Sources

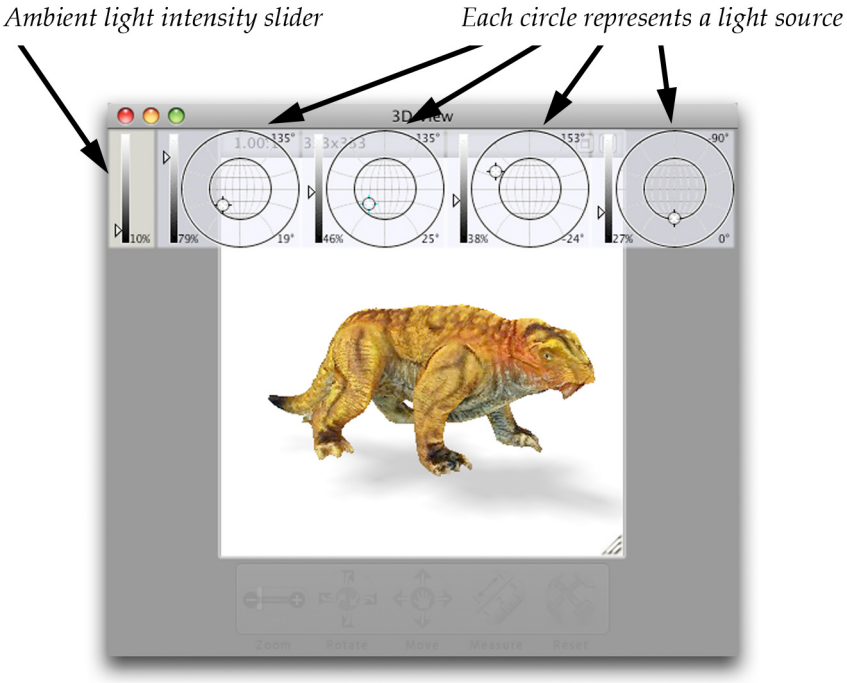
Live 3D provides both **ambient** and **directional light** sources. By default, a model will have three directional light sources along with the base ambient light. These light sources affect all surfaces with materials where the shader is set to Phong.

Ambient light is provided to give a general fill level of light. By using ambient light, no surface will be totally unlit. Even an area that has no directional light hitting it will have the minimum setting of the ambient light.

Directional lights are similar to sunlight in that they are effectively an infinite distance away from the model.

Editing Lights

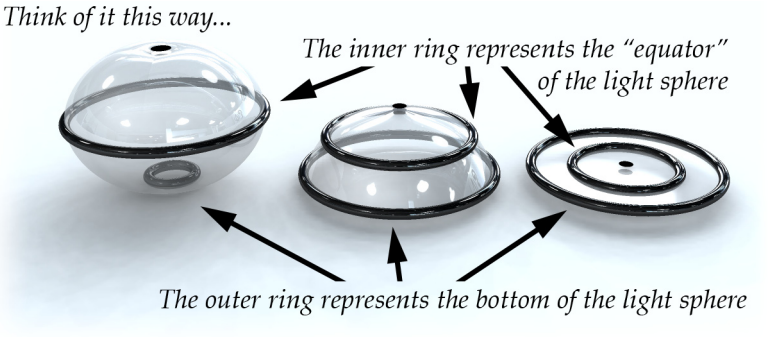
To access the **Scene Lighting editor** open the **Sequences and Views palette** and click on the "**Scene Lighting...**" button.



When you click on the Scene Lighting button, the Lighting Editor appears on the 3D View palette. On the left side of the editor is the ambient light slider. Typically, it will be set at about 10%.

The circular controllers and the adjacent sliders each represent one light source. The cross-hair icon is the light indicator for the position, or direction, of the light source. The center of the circle represents the top down view of the scene, the left side the left, the right the right, and so on.

Think of the circle as an unwrapped sphere. If you could take a flexible cover off of a ball by pulling it open from the bottom and stretching it out flat, that is what this controller represents. Anywhere on the outside ring represents the bottom of the lighting sphere. The circle line in the middle represents the side of the lighting sphere – or the equator if you will. If you place the light indicator cross-hair on the right side of the equator line the light will come directly from the right side. The center of the circle represents the top – place the light indicator icon there and the light will come from the top.



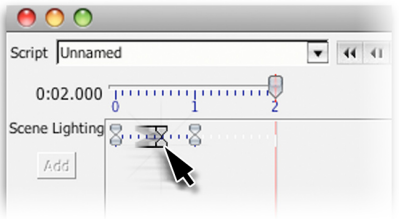
Of course, you can individually adjust the intensity of each of these lights by using the vertical slider to the left of each circle controller.

Adding Lights
To add a light, go to the main menu and select **Insert > Light**. Choosing this command inserts a light, opens the Sequences and Views palette (if not already open), opens the Scene Lighting dialog and applies the **Scene Lighting editing overlay** on the 3D View palette to allow you to position the light and set its intensity.

Deleting Lights
To remove a light from your project, go to Edit menu > Delete > Light and then select the light you want to delete.

Animating Lights
Light source position and intensity can be animated. This is done just like animating all other aspects of the model – by using scripts. However, with lights you bypass the sequence procedure and go straight to scripting.

Here's a quick tutorial on how to animate your light sources: Select **Insert > Script...** The Scripts palette will open with the Append Script dialog floating on top of it. Click cancel to **dismiss the Append Script** dialog. From the list at the right side of the palette, select **Scene Lighting.** Now click the Add button from below the list.



Now click twice on the "**+**" icon on the upper right of the Scripts dialog to add two seconds to the track. You'll note that there are event markers at the beginning of the track but none at the end. Click on the event marker and drag it to the right to the end of the track. The original marker stays put and a new marker is added to the end of the track.

Right-click on your new event marker at the end of the track and select "**Edit**" from the pop-up menu. You'll notice that the Edit Lighting dialog comes up in the Scripts palette and the **Scene Lighting editor** overlays on the 3D View palette. Make any desired edits. Move the light positions and/or intensity. When you're done click the OK button on the Edit Lighting dialog.

Now when you click on the play button in the Scripts palette you'll see the lights animate from the position they started at to the positions and intensity you changed them to in the final event marker.

Shadows
Shadows in Live 3D are highly efficient and designed for maximum "readability". With a floor shadow the sense of dimensionality is greatly increased.

These shadows are created by rendering the silhouette of the scene in a top-down view onto a low-resolution texture. When this low-resolution texture is rendered with linear filtering, it achieves a soft shadow effect, without having to do an expensive "convolution" operation.

For more about shadows and how you can edit them, see the section below on editing the HTML export file.

Materials and Their Effect on Lighting

The way in which light reacts with the surface of an object is controlled by that object's material. With Live 3D you have controls to make a material ignore the effect of light sources and use the inherent luminosity of the texture map itself

– or you can greatly enhance the effect of the light sources through the material controls.

Illuminating the Surface Using Textures
This is the feature described as "**pre-lit**" or "**baked-in**" lighting. To use the inherent luminosity of the texture map (such as photo-based texture maps) you need to turn off the effect of the light sources by **turning off the Phong shader** used in the material. You can do this globally for the entire model or on a material by material basis.

Model created by Xavier Mestres using Strata Foto 3D CX

Model built from photographs which provided "baked-in" lighting

The MestresSculpture **with** *lighting and then set to* **None**

To turn off the lighting effect on a global basis, go to the main menu and select **Edit > Change All Materials > Light None**.

To turn off the effect on an individual material, open the Materials palette (**Windows > Materials**) and right-click on the texture name and select "**Edit...**" In the Edit Material dialog select **None** from the **Shader pop-up** menu.

Enhancing Lighting Using Materials
If you're not using a pre-lit texture as the sole way to light your object then the material settings dictate how your light sources reflect off of the surface. These settings can be altered on a material by material basis or you can utilize menu commands to make global changes.

The following section deals only with the material settings that directly effect lighting. For a more detailed description of the settings in the Edit Material dialog see the Palettes section in Chapter 3.

Individual Light Reflection Material Settings

To access the individual material settings select the Windows > Materials menu command. From the Materials palette right-click on the name of the material you want to alter and choose the Edit command from the pop-up context menu.

> **NOTE:** *All of the following settings rely on setting the Shader pop-up menu to Phong. The Phong shader creates shading by calculating how the light sources in your model will affect the color, value and highlights on the object surface.*

Ambient Intensity

This controls the influence ambient light has on the material (global ambient light intensity is multiplied by this factor).

Diffuse Intensity

This controls the influence directional light has on the material (each directional light intensity is multiplied by this factor, as well as by a factor based on the angle between the light and the surface).

Specular Intensity

This controls the influence directional light has on the specular highlight shown on the material. Specular highlights are always white, and not only add white to the color, but also reduce material transparency. Note that specular intensity and glossiness together control the size of specular highlights.

Glossiness

This controls the size of specular highlights. Specular highlights can be thought of as reflections of the light sources themselves. Numbers approaching 1 will lead to smaller specular highlights.

> **NOTE:** *Surface normals are critical to these calculations. Completely flat surfaces will never have small specular reflections. For flat surfaces, a glossy surface will reflect light over a smaller range of angles than a less glossy one.*

Global Material Light Reflection Settings

There are two global light enhancing settings that can be accessed from the Edit menu on the main menu bar. Select **Edit > Change All Materials >** to see the following light enhancing menu commands:

Light All Matte

This sets all materials to use a Phong shader, with no specular highlights. Specular highlights are reflections of light sources. Without these highlights surfaces are perceived to be dull and non-shiny.

Light All Specular

Converse to the above, this setting changes all materials to display specular highlights, making all surfaces appear glossy. This is done by using a Phong shader with a specular intensity of 1.

Normals, Smoothing and Their Effect on Lighting

This section explains how Live 3D uses **smoothing groups** to compute vertex normals. If you are having issues with the way your models are lit in Live 3D, particularly if you notice differences when the model is published to the web, this section has important information for you.

For models which **use Phong shading**, the shade of the surface color (or texture), and the behavior of specular highlights, are all controlled by **vertex normals**. A vertex normal is a 3D vector, or line, which indicates the direction the surface is facing at that vertex. A vertex is the point where polygon triangles meet. In Live 3D, as in almost all 3D modeling programs, the vertex normals are computed by averaging the surface direction of triangles touching that vertex. This leads to smooth shading across the transition from one triangle to another, making a fundamentally polygonal object look smooth and rounded.

In some cases, you do not want adjacent faces to have smooth shading. Suppose you have modeled a cube. Averaging face normals to compute the vertex normals leads to strange lighting effects, since the boundary between faces actually should be a sharp edge in the case of a cube. In Live 3D this is handled by smoothing groups. Each face of the box can be placed into a different smoothing group, and when vertex normals are computed, a single vertex will end up with multiple normals, depending upon which face is being shaded.

These smoothing groups can be obtained in six different ways:

If you use **Strata Design 3D CX** to build and prepare your models, using the Render to Live 3D function outputs a native Live 3D XMM file. This file retains all the smoothing groups and normal calculations from the original Strata Design 3D CX model.

If you use **3ds Max**, and the Strata export script (use the Help > Extras menu item), then the smoothing groups used by 3ds max are used directly by Live 3D. The only catch is that Live 3D only supports 24 smoothing group bits, not

32 like Max, so you need to make sure you only use the bottom 24 smoothing groups.

If you use a 3D program that **exports normals into the VRML** file, Live 3D will look at those normals and compute smoothing groups which match the normals as closely as possible at import time. Note that many 3D programs have a checkbox in the exporter to choose whether normals are exported: make sure you turn it on!

If you use a 3D program that **does not export normals** (such as Lightwave), Live 3D will look at the topology of the mesh. If two faces share a vertex (and the vertices are "welded" into one vetex), then they will be placed in the same smoothing group. If two faces share a vertex location but use different vertices (the vertices are "split"), then the faces will be placed into different smoothing groups.

1. After import, you can assign new smoothing groups to any object by right-clicking it in the hierarchy and choosing the **Object Smoothing** command from the menu. This command allows you to compute smoothing groups based on the angle between faces.

When you use the Generate LOD feature to reduce polygon count, you can also generate new smoothing groups as part of that operation. Suppose you have a cube with a finely rounded edge. In this case, a single smoothing group leads to attractive lighting effects. But suppose you need to eliminate this fine edge while generating LOD to reduce triangle count. After decimation, it is better to have the adjacent faces in different smoothing groups. By using the **Resmooth Normals** feature of the Generate LOD panel, you can make this correct at the same time you decimate the mesh.

Although it is rare, sometimes after compressing your model for the web, the lighting will change. This can happen because one step of web compression is welding. Vertices which are very close spatially are automatically welded together, to save space during compression. If the smoothing groups are correct, this will have no impact on the visual appearance. But if the smoothing groups do not accurately describe the way lighting should be after welding, then edges that were sharp can become smooth.

To correct this, right-click the problem object in the object hierarchy, and choose Generate LOD. Move the "**Triangles**" slider slightly to the right, and do a decimation. Generating LOD also welds vertices, as well as giving you the opportunity to compute new smoothing groups.

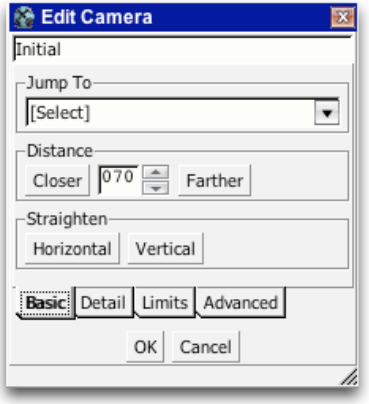
4.5 Setting Your View

In addition to freely rotating, moving and zooming your view from the 3D View palette, you can also modify the base view the **Navigation Bar Reset button** resets to, create **additional views** and even **animate views**.

Modifying the Default "Reset" View

The default view – the one your scene goes to when you click on the "**Reset**" button in the **3D View palette** – can be modified in virtually any way you like.

To modify the view, open the **Sequences and Views** palette. From the "**Jump to View**" menu, in the upper left corner, select "**Initial**". Just to the right of the Jump to View menu is the "**Change View Definition**" button. Click the button and the Edit Camera dialog comes up.



The dialog contains four tabs: **Basic**, **Detail**, **Limits** and **Advanced**. Click on the tabs and review the available controls. The options are fairly self explanatory and you'll note that you have control over every aspect of the camera.

While the Edit Camera dialog is open, you can also make your changes to the camera by making adjustments directly in the 3D View palette.

Once you make changes to your camera, click on the OK button. Now, after you alter the view in the 3D View palette, when you click on the 3D View palette's Reset button, the view will return to the one you defined using this procedure.

Creating Additional Views

You can create additional defined views by clicking on the **Create New View button** in the Sequences and Views palette. The Edit Camera dialog comes up allowing you to define the camera in any way you like. You'll want to give the new view a descriptive name (edit "Unnamed" at the top of the dialog) and click the OK button. You can see your new view in the **Jump to View** pop-up menu.

Animating Views

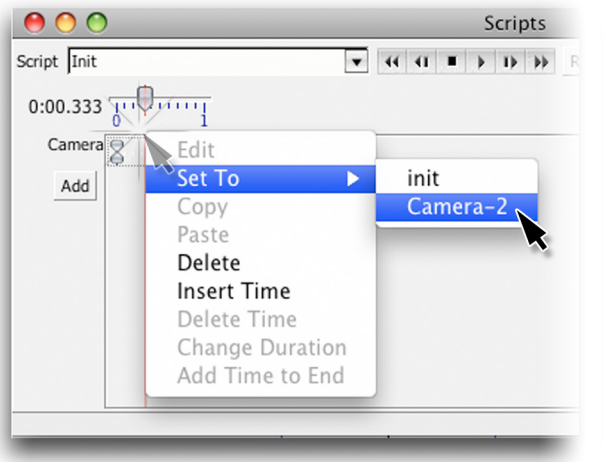
To animate views you simply define multiple views by using the **Create New View** button in the **Sequences and Views** palette. Once you have the views created to define two or more key points in your view animation, you're ready to move on to creating the animation script.

Select **Insert > Script...** from the main menu. The Scripts palette will open with the Append Script dialog floating on top of it. Click cancel to dismiss the Append Script dialog. Now select **Camera** from the list on the right side of the palette, and click **Add**.

Add the amount of time you want for the view animation by clicking on the "**+**" icon on the upper right of the Scripts dialog. You'll note that there's only **one event marker** on the track.

Right-click where you want to create a new event marker, then select the view you want to use from the **Set To >** *menu entry.*

Views are created using the **Sequences and Views** *palette - or they can be imported with your model.*



Right-click on the event marker and select "**Set To**" from the pop-up menu. Choose the view you'd like to use for the beginning of your animation. Now, right-click on the track time-line where you'd like your next event marker. Again, choose **Set To** from the menu to select the pre-defined view you'd like to use for the next step in your animation. Continue this process until you have all of your views represented on the track as **event markers** in the positions in time where you want them. Now click the Scripts palette Play button. You'll see the view animating in the 3D Views palette.

> **NOTE:** *Don't forget to use the* **Rename** *button to give your camera script a recognizable name. This will be important for button names, reusing the script to create reverse scripts and more.*

4.6 Rendering Options

If you export a web tour you have the ability to overlay a sketch mode style of drawing on your textured models, or you can go to a full sketch mode where no textures show through.

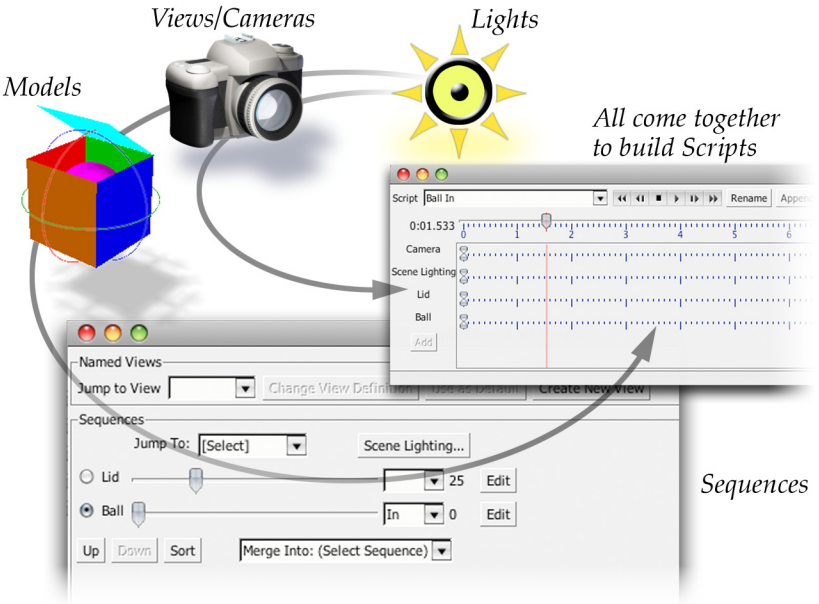
As of this writing the only way to access this feature is through the HTML code that is output with your web tour. Though not a terribly complicated process, it does require that you delve into the HTLM code. You can learn more about how to do this in Editing the HTML File in the **Export and Editing Options** section below.

4.7 Creating Basic Interactivity

Live 3D uses "**scripts**" to create animations and interactive elements. Don't let the word "scripts" scare you though – all scripts are created with easy to use event markers, dialogs and buttons. Scripts are assembled using "**sequences**" and "**views**" that have either come in with your model file or that you build yourself from within Live 3D.

Interactivity Workflow

The starting point is to create sequences that contain "**waypoints**". Waypoints can be thought of as keyframes for the sequence. These waypoint keyframes can then be used in a script track as **event marks** and placed precisely where you want them on the timeline. You can even reuse waypoints as many times as you like within a script track.



The **exceptions** to this waypoint process is in animating **views** and **lights**. For views, you create individual new views in the Sequences and Views palette. These views are then used to create event marks on a script track timeline, just as if they were named sequences. The process of creating sequences and using them to create scripts is described more fully later in this section.

For lights, you go straight to inserting a script by using the **Insert > Script** menu command. From there you select **Scene Lighting** from the list on the right side of the Scripts dialog. Click the **Add** button.

Drag out the starting event marker to make additional markers. From there, right-click on the event markers to bring up the Scene Lighting overlay. For a much more detailed description of this process look in the Animating Lights section above.

Preparing Sequences and Views

Usually, you'll want to prepare your sequences and views prior to assembling them into scripts. Both sequences and views can be created in third party applications, such as Strata Design 3D CX, and brought in with the imported model file. You can also assign sequences to static model data.

Imported Sequences

Animated orientation and position data can be imported in as sequences with waypoints into Live 3D. When using Strata Design 3D CX you have the option of which types of data to export with your XMM file. To bring in data from other applications you will use the VRML file format. The level of support for animation varies with the application – so check the documentation of the 3D product you use to see what features are supported in their VRML output.

New Sequences

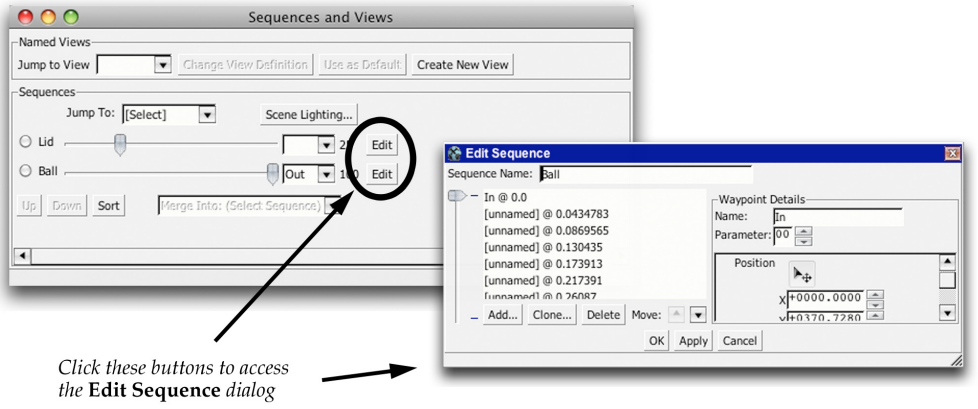
To create a new sequence, choose **Insert > Sequence...** The Insert Sequences dialog appears. You're given the option to create either an Object sequence or a Material sequence. Either of these can be set to be a "Discrete", or non-interpolated, sequence.

If you select Object sequence, the dialog provides a pop-up menu allowing you to select an object from your model to use for the sequence. In either case, when you click the OK button, you're provided with the Edit Sequence dialog, which is discussed in the next section.

Editing Sequences

When editing a sequence, whether it's an imported sequence or one you've created using the Insert > Sequence command, you are presented with the **Edit Sequence dialog box**. To access the dialog on a preexisting sequence, open

the Sequences and Views palette and click on the Edit button to the right of the listed sequence's slider.



Click these buttons to access the **Edit Sequence** *dialog*

One of the first things you'll want to do is provide a logical name for the sequence – such as Box Open. This follows an important convention in Live 3D. The first part of the name should be the object being animated and the second part should be the operation being performed. You will see the importance of this as you move through your scripting process.

The Waypoint List

The left side of this dialog is identical, regardless if you're editing a material based sequence or an object based sequence. This left side contains the list of waypoints currently contained in the sequence. Using a row of buttons across the bottom of this section, you can choose to add, clone, delete and move waypoints within the overall order. Individual waypoints in the list can be selected for further editing in the right side section, Waypoint Details.

Waypoint Details

The contents of the Waypoint Details section vary depending on whether you're editing an object based sequence or a material based sequence. For all waypoints – as with sequences and scripts – it's important that you provide logical names for your waypoints. The Name field at the top of the Waypoint Details section allows you to name the waypoint.

Object based sequences allow you to edit the object's position, orientation, location of the pivot, and the object's opacity. Material based sequences allow you to edit the material alpha, and apply a color curve filter to the material. For

material sequences, you specify a set of materials to animate by pressing the Select… button and select the desired materials from the list.

You can read more details about the Edit Sequence dialog in the Palettes section of this User Guide.

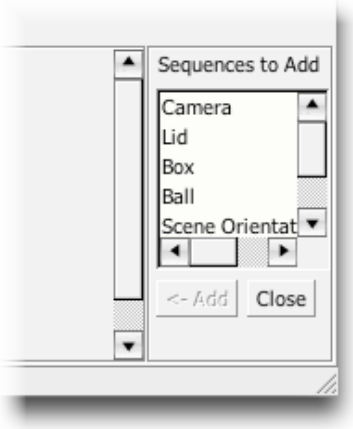
Building Scripts

Once you have your sequences created (or views in the case where you want to script view animation) you're ready to build some scripts.

New Scripts

To create a new script select the menu command **Insert > Script...** This command brings up the Scripts palette and the Append Script dialog. To create a new script you'll want to click Cancel on the Append Script dialog.

From here you can select the sequence you want to use for the new script from the pop-up menu on the right side of the Scripts palette.



Now you have the beginnings of a new script. You'll notice that the script is listed as "Unnamed" in the upper left of the Scripts palette. Even though the sequence you're starting from has a name, the script is unique and should have a unique name. But more than just a unique name, the name should conform to the following convention [**name of object**] plus [**action or operation**] – for example, **Box Open**.

Following this naming convention is important in order to take advantage of Live 3D's built-in heuristics logic. If you go through the Ball in Box tutorial below, you'll see that after creating the Box Open script, the reverse of this

script is automatically named Box Close and even the preconditions are automatically set.

To rename your script, click on the **Rename button** at the top of the Scripts palette.

Once you've inserted your new script you can add additional **event markers**. Some sequences will come in with more than one event marker. Some will come in with only one event marker at the beginning. Regardless, you can add event markers in a few ways.

If you drag the first event marker to the right you will see that it makes a copy and leaves the first event marker in place. You can also right-click on the track of the sequence you wish to add an event marker to and select **Set To >**. If the track doesn't represent a sequence that you've properly prepared, the Set To > menu item may not have any items in it – Set To > will only show named waypoints. You can also double-click anywhere on the track to insert a new event marker.

You can edit any existing event marker by using the above described right-click menu and choosing **Edit** or **Set To >**. You can also double-click on an existing event marker to edit it.

Appending an existing script is especially useful for creating a reversal script – such as **Box Close** if you already had Box Open. To create an appended script, you can select Insert > Script or click on the Append Script button at the top of the Scripts palette. The button will add the appended script to the script you're currently working on. The Append Script dialog will appear on top of the Scripts palette. You may have to un-check the **Respect Preconditions** checkbox in order to find the script you want to append from the pop-up list.

Once you select the script you wish to append, you now need to make the choice of whether to reverse the script or not. If yes, then select the **Reverse Script** checkbox. Click OK and you will see the copy of the existing script as a track in your Scripts palette. If the script had previously been setup with "Preconditions" and "Befores" these will be included and/or respected in this new copy.

Preconditions specify things that must be true in order for the script to make sense. If the box should be open before the ball can come out, then you would choose the Box Open script as a precondition to running the Ball Out script. In this case, the viewer would need to open the box before he can choose to take the ball out. Setting preconditions are as easy as clicking on the **Edit Preconditions** button and selecting the precondition states for the objects listed.

Befores are references to other scripts, which need to run before the script that you're creating. Using our previous example, if you want the viewer to be able to take the ball out without having to explicitly open the box first, you could set Box Open as a **Before** for the Ball Out script. This would cause the Box Open script to run before the Ball Out script runs.

For a more detailed walk-through of the animation process see the Ball in Box tutorial below. For more detailed explanations of the features found in the Sequences and Views palette, or the Scripts palette, see the Palettes section of Chapter 3, The Workspace, above.

4.8 Export and Editing Options

This section covers dealing with export options other than compression and optimization issues. Those issues are covered in Making Efficient Models above.

Using Navigation Bar Templates

When you're exporting your web tours, you can select **Export > Other > Examine (Choose Nav Bar)** to choose a different Navigation Bar than the standard controller.

The first dialog you encounter will ask you to choose a name and location to save your web tour. The next dialog will be the **Select Design Template** dialog, asking you to choose from a list of Navigation Bar web templates.

You can see that there's a variety of templates available to choose from. You can even create your own version of these templates. See the tutorial called **Creating Custom Navigation Bars** in Chapter 5 below.

Making Walk-Through Presentations

In addition to all of the options available to you for creating Product Tours, Live 3D can also be used to create walk-through-style web tours for environmental design, interior design, architectural applications and more. When you use the menu command **Export > Web > Walk-Through** your web tour will be exported with a special Navigation Bar designed for this type of project.

The following recommendations will help you author web tours with walk-through navigation:

- From the Sequences & Views palette, select the **Initial** view from the **Jump to View** menu. Next, click on the **Change View Definition** button. Set the camera distance to **zero**, to bring the viewer into the scene. Use the Advanced tab to adjust the exact location of the camera.
- Create scripts which take the viewer to various points of interest. Give each script a camera track, and edit the camera waypoint to move the camera center location to the desired location. The user will then be able to "walk" starting at this place.
- If the model has multiple floors, be sure to create scripts which take the user to each level. The applet will not allow the user to change elevation, by default.
- You may need to edit the HTML to change the walking speed (look for the variable walkSpeed). The walking speed is based on model units, so very large or very small units in the original model may give you unexpected results in the walk-through presentation. See the next section for instructions on editing the HTML file.

Export the tour using the **Export > Web > Walk-Through** option.

> **NOTE:** *There is currently no viewer feature available for collision detection or elevation grid support. This puts the viewer in what's commonly called in 3D games "God Mode" – with the viewer being able to walk through walls, etc. This obviously has both benefits and drawbacks.*

Editing the HTML File

When you export a web tour using the Export command, several items are placed in the directory with the 3D model .JAR file. One of the items exported is an **HTML file**, which includes an APPLET tag. An APPLET tag is a line in the HTML file that tells the browser to automatically download an applet (a small software application) and run the applet within the user's browser.

Following the APPLET tag, which shows up as "**<applet**" in the HTML file, is a section of special code that helps to drive the web tour.

The following sections review some of the things you can do to alter how your web tour looks and functions. All of these discussions assume that you've browsed to the folder where you saved the web tour. Also assumed is that you'll be using a basic text editor (such as WordPad on Windows) to edit the HTML file. **Do not** use a word processing application like Microsoft Word because it will end up adding **hidden formatting characters** that will cause problems in the end.

Change the Web Tour 3D View Size

You can alter the size and aspect ratio of the 3D viewing window for your web tour by editing the HTML code. Open the HTML file, find the APPLET tag, and change the **width=** and **height=** parameters to whatever size you want. These dimensions are in pixels, so keep that in mind as you make your calculations.

> **NOTE:** *The larger the viewing window, the lower the interactive update rate will be.*

Save your changes and view the HTML file with your browser (if your browser is still showing the file, just click the Refresh button).

Change Web Tour Text Button Positions

You have some control over the position of the text-based interactive buttons in your web tours. Open the HTML file, find the line that reads:

```
scriptButtonsSpace=100;
```

This tells the user interface to leave 100 pixels of space on the left for the Script control buttons. This may be too much space for smaller web tours. Try changing this number to the following:

```
scriptButtonsSpace=0;
```

Save the file, and view the HTML file with your browser (if your browser is still showing the file, just click the Refresh button).

Create the Illustration Sketch Look

You can add lines that take on the look of an illustration, or sketch, to your projects. In the HTML applet code, look for these lines of text:

```
customizeUI={

Shadow.Shadow_3d.alpha=0.0;

Shadow.Shadow_3d.width=Shadow.Shadow_3d.height=96;

Shadow.Shadow_3d.below=0.001;

uiDone();
```

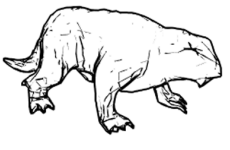
This is the code for displaying the shadow underneath your object in the web tour. Add this code to that block, just above **uiDone();** :

```
Scene.3d.illustrationMode=true;

Scene.3d.illustrationThickness=.008;

Scene.3d.illustrationThreshold=40;

Scene.3d.illustrationLineColor=”9C9CD3”;

Scene.3d.illustrationFillColor=””;
```

The final block should look something like this:

```
customizeUI={

Shadow.Shadow_3d.alpha=0.0;

Shadow.Shadow_3d.width=Shadow.Shadow_3d.height=96;

Shadow.Shadow_3d.below=0.001;

Scene.3d.illustrationMode=true;

Scene.3d.illustrationThickness=.008;

Scene.3d.illustrationThreshold=40;

Scene.3d.illustrationLineColor="9C9CD3";

Scene.3d.illustrationFillColor="";

uiDone();
```

Thickness=.006;
Threshold=20;
LineColor=black;
FillColor=white;



Thickness=.013;
Threshold=100;
LineColor=black;
FillColor=gray;

Thickness=.008;
Threshold=40;
LineColor="9C9CD3";
FillColor="";

Thickness=.01;
Threshold=40;
LineColor=black;
FillColor=white;

The first line you added tells the Live 3D renderer to use the illustration mode instead of the regular renderer:

```
Scene.3d.illustrationMode=true;
```

You can set this to "true" or "false" to quickly change between rendering modes.

The second line determines how thick your outlines will be in sketch mode:

Scene.3d.illustrationThickness=.008;

The number here is in the default units for your object, most likely inches. Very small numbers are required. Lines of this thickness will be drawn on the silhouette of your object automatically.

The third line determines the breaking angle where a line will be drawn on your object. It takes a look at the edge wherever two polygons meet. If that angle is equal to or less than (in this case) 40 degrees, it will draw a line on that edge.

Scene.3d.illustrationThreshold=40;

The proper number here will be highly dependent on the detail of your model. For example, if the model is very low resolution, you will likely have very high breaking angles, and this number may need to be reduced to avoid an excess of illustration lines on your model. If you wish to outline more of your model, you would want to increase this number. As an extreme example, if you used **180** degrees, the renderer would put a line at every joint. This is because 180 degrees would represent two polygons that line up perfectly.

The fourth line determines the outline color used:

Scene.3d.illustrationLineColor=”9C9CD3”;

The outline color is noted here as a **Hexadecimal color code**. This code can be found in the bottom of the color selector in Photoshop and many other popular image editors, as well as numerous places online. You can also use simple color definitions here, such as **red**, **green**, **black**, **white** or **orange**. When you do choose to use color names **do not use “**quote**” marks**. The line using a color name should look like this:

Scene.3d.illustrationLineColor= purple;

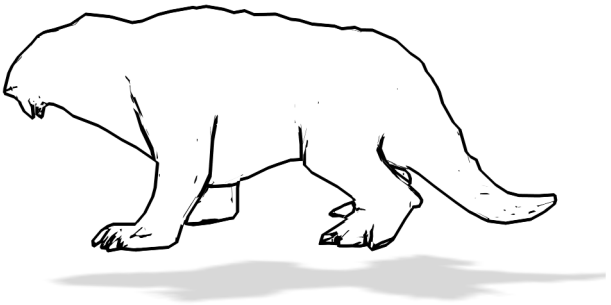
Again, notice **no quote marks** when using color names.

Color names give you far fewer color choices, but are easier to read. If you do not want outlines on your object, you can set this parameter to nothing:

Scene.3d.illustrationLineColor=””;

The fifth line determines the fill color used for your object (note again using quote marks on a Hexadecimal color):

Scene.3d.illustrationFillColor=”FFFFFF”;



Just like the outline color, this value is a Hexadecimal color code, and can be replaced with a simple color name. If you set this value to nothing, the regular textures of your object will display instead of a fill color:

Scene.3d.illustrationFillColor=””;

If you want the background color or background image of the web tour to show through your object (see instructions below for color and image backgrounds), set the fill color to nothing, and alter the textures in your web tour to have an alpha value of 0. You can, of course, use intermediate alpha values to get differing levels of shading on your object, and use the “composite” value to determine how those semi-transparent surfaces look when they overlap each other.

Change the Background Color of the Web Tour

To change the background color of your web tour, look for this line in the HTML file:

Applet.Primary.fill=”FFFFFF”;

In this case, “FFFFFF” is Hexadecimal for white. “000000” would be black. This code can be found in the bottom of the color selector in Photoshop and many other popular image editors, as well as numerous places online.

Simply replace the Hex code with the color wanted.

Applet.Primary.fill=”000000”;

You can also use simple color definitions here, such as **red**, **green** or **orange**. These give you far fewer color choices, but are easier mto read.

Add an Image Behind Your Web Tour
Underneath the line in the HTML file that determines the background color of the tour:

```
Applet.Primary.fill=”FFFFFF”;
```

Add these two lines:

```
Applet.Primary.image=”blueprint.jpg”;

keepDisplayImage=true;
```

The first line is the location of the background image you want to use, relative to the HTML file. The second line ensures that the image stays throughout the tour. If you set this line to “false” the background image will act like a “splash screen” and disappear once your 3D model has loaded.

Change the Navigation Bar
This line in the HTML code specifies what navigation controller is used.

```
Data.Program.url=”stratathin.jar”;
```

Just like the model file, the Navigation Bar is also a “.JAR” file. You can create your own custom Navigation Bars, or use one of the included navigation files located in your Live 3D install directory, in the Web Templates folder.

You simply change the name of the Navigation Bar file to match the new one you want to use:

```
Data.Program.url=”minimalist.jar”;
```

…and ensure the correct navigation jar is in the same folder as the web tour. Similarly to the “codebase” item above, you can centrally locate these navigation bars and call them using a root path:

```
Data.Program.url=”/java/minimalist.jar”;
```

This will look for the navigation jar in a folder named “java” in the root of your site:

```
eg. http://www.strata.com/java/
```

Modify the Drop Shadow
Shadows are dynamically generated by the Live 3D player. They are created by rendering the silhouette of the scene in a **top-down view** onto a low-resolution texture. When this low-resolution texture is rendered with linear filtering, it achieves a **soft shadow effect**, without having to do an expensive

"convolution" operation. This generally works very well for real products, but for some scenes you may want to modify the effect.

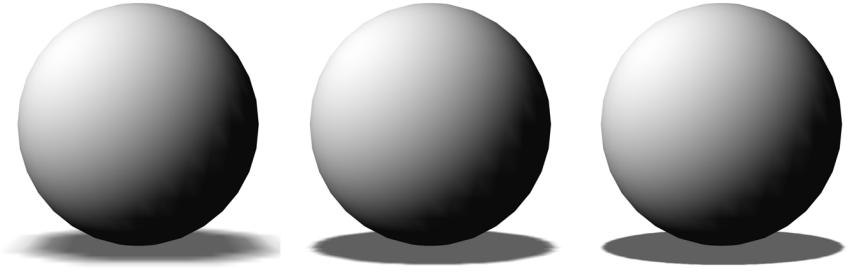
In your text editor, find the following line in the HTML file:

```
Shadow.Shadow_3d.alpha=0.75; /* Set to 0.0 for no shadow */
```

To improve the quality of the shadow, replace that line with the following:

```
Shadow.Shadow_3d.alpha=0.25; /* Set to 0.0 for no shadow */

Shadow.Shadow_3d.width=Shadow.Shadow_3d.height=96;

Shadow.Shadow_3d.below=0.001;
```

The first line controls the alpha (transparency) of the shadow. By lowering it from 0.75 to 0.25, the shadow is lightened. The next line sets the width and height of the Shadow to 96x96 pixels. This results in a sharper, more detailed shadow. The last line sets the shadow to be just a hair below the bottom of the 3D scene.



Save the file, and view the HTML file with your browser (if your browser is still showing the file, just click the Refresh button). Try playing with these settings. You can always customize your shadows to best fit the project at hand.

Using More than One Web Tour on Your Site

When you use multiple web tours, you'll want to change the base path for the core Java classes. The first line of the APPLET tag defines the classes that the web tour needs to operate:

<applet id=”meson” code=com.kaon.meson.MesonApplet

archive=’mesonApplet.jar,rasterGluon.jar,sceneGluon.jar’ width=’500’

height=’500’ mayscript alt=’Please Enable Java’ codebase=”>

If you have more than one Live 3D web tour on your website, Java may hold these core items in memory, and cause subsequent tours to become unstable. The best way to avoid this is to put these files in one location on your site, and link every tour to the same classes. The way you do this is by entering a path in the “codebase”. This item works like any other path in HTML. If you want to keep these files in a folder called “java” in the root of your site:

http://www.strata.com/java/

You would change the codebase to look like this:

codebase=’/java/’

The Applet will look to that folder for all of the items located in the “archive” parameter. This way, if you are uploading many tours, you only need to upload the three archive classes once, to one location, regardless of where the tours are located in your site structure.

Making Better 3D PDF Documents

The Live 3D CX 2 PDF solution has been specially designed to maximize the capabilities of PDF documents to be used for sales, marketing, and presentation purposes. Adobe’s native 3D PDF solution was designed for, and works very well with, CAD files. As Adobe puts it, their 3D platform “helps manufacturing and other extended teams communicate 3D design intent more securely and reliably.”

The good news for designers, illustrators and artists of all stripes, is that Live 3D integrates directly with the Adobe solution, using their own U3D file format. The Live 3D exporter for PDF outputs a U3D file and a companion Javascript, which is automatically placed in the PDF file. Together, these provide the end-user with a much more visual and rich experience.

Strata Live 3D PDF Benefits

Better Compression

Sales & Marketing oriented PDF’s need to be as small as possible. Whether used as a click-download, or sent via email, with PDF’s, size does matter. Strata’s proprietary optimization algorithms yield 3D PDF content which is

dramatically smaller than PDF's created using the standard U3D encoder found in other applications.

Faster Load Times

Once the end viewer has the PDF file on their local machine, startup time can be an issue. The same optimizations which make Live 3D PDF files smaller, also make them start up much faster.

Better User-Controlled Navigation

By default, Adobe Reader provides a user navigation system (toolbar, mouse gesture handling, etc.) which are not designed for marketing oriented needs. The base interactivity of the standard 3D PDF's are oriented toward the CAD community – which can mean "non-intuitive" for you audience. Strata 3D PDF's include a custom user navigation system, written entirely in Javascript, which gives the user an easy-to-use toolbar, intuitive rotation, and smooth camera motion. It also ensures that all users can interact with 3D content the same way, regardless of which version of Adobe Reader they happen to be using.

Measuring

Live 3D's custom navigation toolbar includes an easy-to-use point to point measuring tool. Users have control over the displayed units using the right-click context menu in the 3D window.

Material Swaps

Using Live 3D's tools, your 3D PDF file can automatically be generated with all the extra object hierarchy and Javascript code required to allow changes to materials at run time. This can be used, for example, to show a single product in several finishes, or to change the screen image displayed on a 3D mobile phone or camera.

Interdependent Animations

One of the things the engineers who designed Live 3D have learned though years of creating interactive 3D product models is that once you have more than a couple moving parts, things start to get really complicated quickly. The user can get the object into unexpected configurations, and the next thing you know, parts are moving through each other in ways that make no sense, and can be really confusing.

Live 3D has addressed this problem via the Master Model format, which allows the relationships between animation scripts, and relationships between scripts and object state, to be stated in simple terms that prevent errors. Rather than using the primitive built-in animation capabilities of the U3D format, Live 3D

uses this Master Model animation system, implemented entirely in Javascript within the Live 3D PDF. The end-user gets a collection of easy-to-use animation buttons, which automatically do the right thing no matter what order the user tries them.

Mouse-over Hot Spots

It is a well-established technique in 3D games and applications to give users more information about a product, or even trigger animation sequences, based upon mouse gestures such as hovering over a place on the 3D model. Live 3D's toolset makes it relatively easy to provide this kind of interactive experience to the user within a PDF.

Debugging Tools for Your 3D PDF's

This section shows you how to access some built-in debugging features that Live 3D puts into every 3D PDF. To avoid end-users of the PDF from accidentally enabling these features, they are protected by a simple password: **777**.

To access these functions, open a 3D PDF using Adobe Reader, click in the 3D area of the page, and type 777. Now you can type other keys to trigger different actions:

W Switch to Wireframe rendering mode and back

I Switch to Illustration rendering mode and back

S Switch to Solid & illustration rendering mode and back

C Display Contents, displays some information on the model (version of Live 3D U3D Exporter, version of Adobe runtime, object count, polygon count, texture count, texture size)

L Avoid zoom-in Limits (useful if you want to zoom-in closer than is allowed by default)

B Starts/stops Benchmarking mode in which model starts rotating

F Display FPS, to measure FPS precisely it should be used in benchmarking mode. Press B, wait 5 seconds, press F.

Editing the XML File

The Live 3D model is encapsulated in the XML code. You can learn more about this format and how to edit, and enhance it by going to the Live 3D Help menu

and selecting the **Master Model Format** command. This will bring up the Master Model specification web page on the Strata website.

You can edit the XML representation of the Master Model code directly from within Live 3D by selecting **Edit > XML**. This will bring up the Edit XML dialog. You can use this dialog to do your editing – but this isn't the best way to go. The Edit XML dialog is a very simple text editor and doesn't supply any features such as Search and Replace, so you may find that using a third party text editor is easier.

> **NOTE:** *Simple text editors, such as WordPad on Windows, work best because they don't add any hidden formatting characters to the text.*

There are two ways to use an external text editor: Copy and Paste, or; Using an "unpacked" model.

Copy and Paste Method

This approach is fairly straight forward. To edit just a portion of the XML code, open the Edit XML dialog and select the portion of the code you want to edit (by clicking and dragging). Next, copy the code using **Ctrl - C** (**Cmd - C** on Mac). There is no Edit menu in the Edit XML dialog, so you need to use the command key equivalents.

Paste the copied code into the editor of your choice. When you're through editing, just paste the text back into the Edit XML dialog using **Ctrl - V** (**Cmd - V** on Mac).

To edit the entire document, click anywhere in the code (to make sure it's the active content area) and hit **Ctrl - A** for Select All (**Cmd - A** on Mac). Now hit Ctrl-C to copy. Open your text editor of choice and paste the text into a new document. Do the reverse of this to paste the edited XML code over the existing code in your model.

Using an Unpacked Model

You can save your model in all of its separate components by using the **Save As** command – this includes a separate XML file of your model. Once you have the separate elements, you can open the XML text file directly with your text editor of choice and simply save your changes. You can then use the **File > Reload XML** command each time you want to see the effect of your changes. In some cases you may need to export a 3D web tour from Live 3D to see the changes in action – such as pop-up text hotspots.

To save an unpacked version of the Master Model, select **File > Save As...**. Create a new folder for the model's content, then **specifically** save the model under the name **MASTER.XML**. When you do this, the XMM data will be

saved unpacked into the folder you navigated to. This technique should not be used on models with more than a few hundred objects as System software performance may drop dramatically when folders have thousands of files in them.

Once you've done your Save As command, open the folder you saved your model into. You'll see the file named **MASTER.XML**. This is the file you'll want to edit, save and then reload.

Working with Flash

Live 3D is set up to create content that works with Flash content. To create Flash integrated 3D content, you will want to build your model just as you would for a regular web tour. When it comes time to export, choose this command: **Export > Other > Flash Embedding**. This export option creates an ActionScript macro program which causes the Flash authoring application to create a default user interface for the product tour. This default interface can then be customized using Flash. The 3D component of the tour is still produced using the Java applet, but this option embeds the 3D component in a Flash movie, for added flexibility in authoring.

> **NOTE:** *Flash Embedding is a legacy feature which may not work properly with later versions of Flash.*

The following information is for more advanced users, and requires a knowledge of Flash, the Live 3D XML code and some Meson scripting:

Using a "Mouse" Event in the 3D View to Trigger Flash

When integrating 3D with Flash, it may be desirable to have mouse clicks on objects in the 3D scene trigger behavior in the Flash movie.

First, you need to create a "**Trigger**" in the Master Model, corresponding to the mouse-able area. See Using XML for Targets with Pop-Up Text – found in Chapter 5 – to learn how to make a Trigger.

Once you have a mouse-area Trigger embedded in the XML code, use the menu item **Export > Web > Examine** to test that you've created the Trigger in the right place.

Next, use **Export > Other > Flash Embedding** to create a Flash movie with the embedded 3D model. Use a slightly different name, or put it into a different folder, so that the first web tour's HTML file is not overwritten. For example, you might have files widgetWeb.html and widgetFlash.html. The next step involves adding some Meson statements to the widgetFlash.html file, based on

what you see in the widgetWeb.html file. So open both files in text editors, such as WordPad.

In the web HTML file, find the line that looks like this:

```
makeHotSpot(^location=[SceneRT.Scene_...],^text="...",^script="")
```

Copy the part in square brackets, including the brackets.

In the flash HTML file, find the line that reads:

```
/* Define functions to be called by Flash */
```

Immediately before that line, add the following:

```
HotSpotRT.MyHS1.location=[...the location you copied from the other file...];

FlashVar.MyHS1_press.test={HotSpot.3d_MyHS1.press}
```

In your flash movie, you can detect mouse clicks on that point by testing the variable _**root.MyHS1_press**. To respond to mouse-over, you would use:

```
HotSpotRT.MyHS1.location=[...the location you copied from the other file...];

FlashVar.MyHS1_hover.test={HotSpot.3d_MyHS1.hover}
```

If you have multiple Triggers, you can create multiple lines like these. Just be sure to replace **MyHS1** with **MyHS2**, etc.

Note that this will not cause anything to appear in the 3D window telling the users where the Triggers are. If that is a requirement, you will also need to create images to display at the location on the screen. For example:

```
Image.MyImg.file="arrow.gif";

Image.MyImg.parent="Scene.3d";

Image.MyImg.anchor=_S;

Image.MyImg.enabled=false;

Image.MyImg.offsets=[{HotSpot.3d_MyHS1.x},{HotSpot.3d_MyHS1.y},

 {HotSpot.3d_MyHS2.x},{HotSpot.3d_MyHS2.y}];
```

Note that these images will always be displayed. To hide images when their hotspot is hidden, change the last line to:

```
Image.MyImg.offsets=[{HotSpot.3d_MyHS1.visible?HotSpot.3d_MyHS1.x:_N},

{HotSpot.3d_MyHS1.y},{HotSpot.3d_MyHS2.visible?HotSpot.3d_
MyHS2.x:_N},

 {HotSpot.3d_MyHS2.y}];
```

For more information on the classes used in this example, see the Meson User Manual. From the main menu select Help > Meson Language Manual.

Chapter 5

Live 3D CX 2 Tutorials

Basic Interactivity: Ball in Box

This tutorial walks you through bringing in data and publishing it to the web. Along the way we will cover many features of Strata Live 3D CX 2. While this tutorial uses a Strata Design 3D CX model, nearly everything we'll cover applies no matter what program you use to create your 3D content – though the specifics of how you get the data into Live 3D and what the file structure will look like may vary a bit.

All of the files used for this tutorial can be found in the Tutorial Files folder located in your Strata Live 3D CX 2 application folder.

Ball in Box Tutorial Part 1

If you are a Strata Design 3D CX user, you should **open** the **BallInBox.s3d** file in that application. Non-Design 3DCX users should just follow along – we'll bring you in shortly!

Step 1: Animate the Scene

You'll note that the BallInBox.s3d file is already animated. You can check this animation by opening the **Project Window** and clicking on the **Play** button. You'll see that the Lid of the box opens, and the ball comes out. We won't be covering how to set up Strata Design 3D CX keyframes in this tutorial – but the important thing to notice is that every part of the scene goes through its entire range of motion during the timeline. This is how you create animation for use in Live 3D: Make a timeline in which everything happens. It doesn't really matter in what order things happen, how many frames the actions span, etc. Live 3D will analyze the timeline to find every part's range of motion.

Step 2: Render to Live 3D

This is a special function in Strata Design 3D CX for saving out a **native Live 3D XMM** file. To do this, you select the menu **Render > Render Live 3D**. This will bring up the Render Live 3D dialog box. You'll want to select all of the

options for this project except for “Camera Script” and “Scene Playback Script.” Click the OK button and select a place to save the .xmm file. Name the file “**BallInBox.xmm**”.

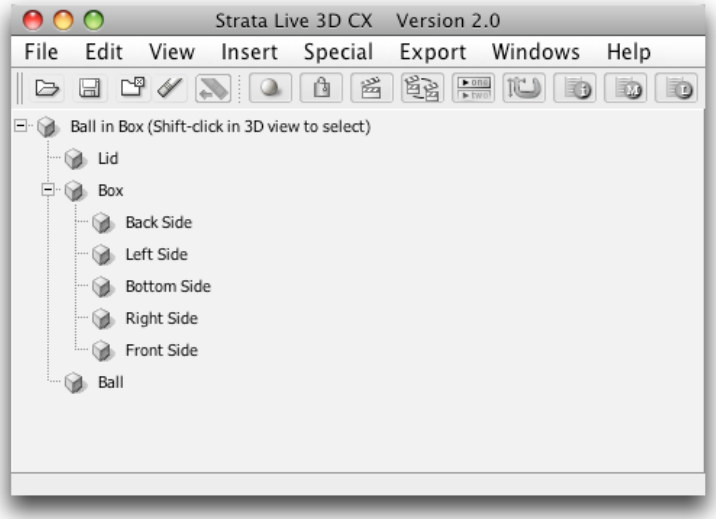
You can also export VRML files from other modeling applications, however you may need to experiment with the export options.

At this point you should have an .xmm file which is just like the one you can find in the Tutorial Files folder in your Strata Live 3D CX 2 program folder. Non-Strata Design 3D CX users can start from the BallInBox.xmm tutorial file and jump in here!

Step 3: Open the .xmm file in Live 3D

Strata Design 3D CX users, launch Strata Live 3D CX 2 and drag the .xmm file you created into the Live 3D main palette. (Or, use **File > Open...** to browse to the .xmm file).

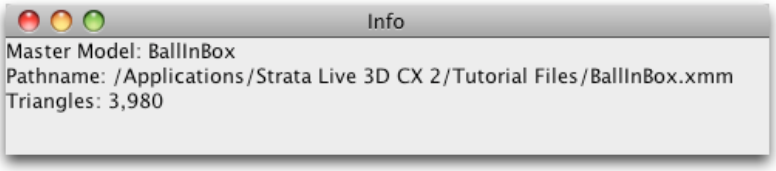
Non-Strata Design 3D CX user, or if you just want to start from here, open the file BallInBox.xmm located in the Tutorial Files folder.



The hierarchy appears in the main palette, and an orange rectangle appears in the **3D View palette**. You'll notice that, although there appears to be many objects, essentially there are only three objects in the scene. One object, the Box, is a group and contains five sides (Back Side, Left Side, Bottom Side, Right Side and Front Side). The top is a separate object (the Lid), making the total of six sides for this cube.

Use the Windows > Log menu item to find the Log palette. If you set it to show Progress Messages, you will see an indication that you opened the .xmm file. The View Log File button on this palette gives a much more detailed rundown of everything that happens in Live 3D. It can be useful, in particular, if you have trouble importing a VRML .wrl file, as some diagnostic messages may only appear in the log file.

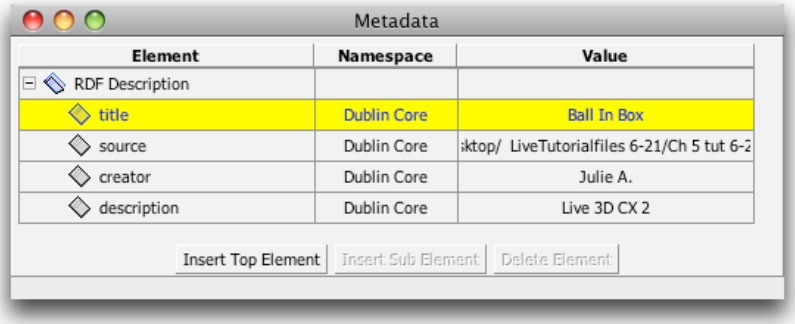
Use the **Windows > Info** menu item to see details about the model. Note that it has **3,980 triangles**, which, while not terribly high, is kind of silly for something so simple. We'll deal with this issue later on in this tutorial.



Step 4: Modify Names
Use the **Windows > Metadata** menu item to open the **Metadata Editor**. Click the "**Insert Top Element**" button, and add a "creator" element.

Type in your name and then hit the Enter key. Now, double-click on the right side of the title row (in the "**Value**" column) to change the model name. Make it a little more "human readable" by changing the name to **Ball in Box**.

Notice that the model name at the root of the hierarchy in the Main Menu changes, as does the name in the Info palette. This name will also be used as the default HTML title for generated web pages. While you have the Metadata palette open, feel free to add more Metadata to the model.

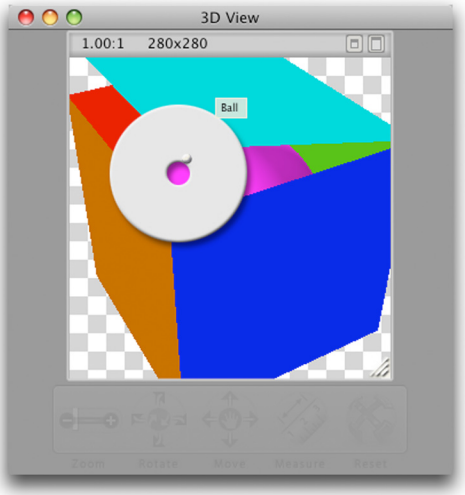


Close the Metadata Palette.

You can rename individual objects in your scene by right-clicking on them in the hierarchy view and selecting "Rename" from the contextual pop-up menu.

Step 5: Adjust Backfacing
In the 3D View palette, rotate the Box down a little, and right click on the Lid (it should be the teal colored side). The Disc that shows up provides a small sphere as a control for the Lid animation sequence that was created in Strata

Design 3D CX. Using the right mouse button, slide the Lid control away from the center of the Disc to open the top of the box.

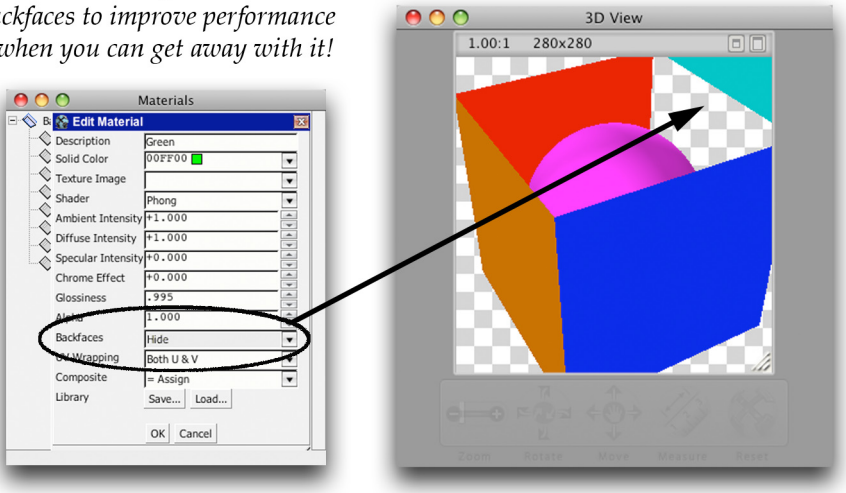


The **Sequence Disc Controller** *provides access to animation sequences in the* **3D View palette.**

Now hold down the Ctrl key (Mac and Windows), and click on the green Back Side. This opens the Materials palette (which you could have opened using the **Windows > Materials** menu item), and selects the green material used by the Back Side.

Right-click on the selected green material, and choose Edit. Find the Backfaces pop-up menu, and change it to Hide. This will set the green material used by the Back Side to use no backfacing, while every other material will continue to show backfaces. Click OK to dismiss the dialog.

You can selectively Hide Backfaces to improve performance - when you can get away with it!



Clearly, we have a problem! There is no interior back to this box. Obviously, we don't want the box to disappear when we open it and look inside. In the case of the change we made to the Back Side this is exactly what happens. Rotate the box around to get a look at it from behind. You'll see that the green Back Side is still there. It's just that the triangles that are facing into the box are now being hidden because of the change we made.

You already know how to change this back so the green panel is showing – do that now.

If we wanted to change all the materials so that they were one way or the other, we could just use the "**Edit > Change All Materials >** menu and select "**Backface All**" or "**Backface None,**" among many other options.

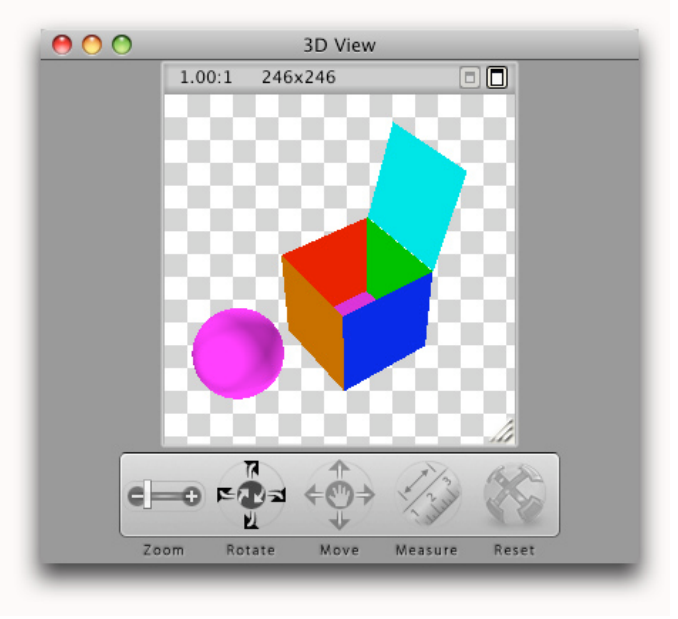
However, the Ball is the only object that doesn't really need backfacing polygons, since it is a closed object. Select the "Ball Pink" material from the Materials palette, right-click and select Edit. From the Edit Material dialog choose "Hide" from the Backfaces pop-up menu. Click OK to dismiss the Edit Material dialog, then close the Materials palette.

It's good practice to avoid the use of backfaces wherever possible, as it can often improve performance by a factor of two to not have to draw unnecessary triangles.

Step 6: Adjust the View

The default initial view is just large enough to hold the scene in the state it started in. In the 3D View palette, right click the ball, and move the Ball sequence control out (you may need to rotate the box so you can see the Ball). Using the Disc controller will move the Ball out of the box, and out of the view. Clearly, we need to move the camera back so we can see everything.

Use the **Windows > Sequences & Views** menu item to show the Sequences and Views palette. At the top of that palette, set the "**Jump to View**" pop-up menu to "**init**" for the Initial view. Now click the Change View Definition button. Increase the Camera distance. You can type in a number, click the up and down arrows, use the Closer/Farther buttons, or click the up/down arrows and drag the mouse up/down without releasing the mouse button. A distance of about **850** is sufficient to ensure the Ball stays visible when it is removed from the Box.



You can also adjust other attributes of the initial view, such as the orientation, field of view, and zoom limits. You can do this using the various tabs of this dialog box and/or by clicking and dragging in the 3D View palette. You can change the controls in the 3D View palette to adjust whether you're turning, moving or zooming the model.

Find a viewing angle that looks good, and click OK to dismiss the dialog.

Note that after adjusting the Initial view, it is a good idea to set it as the default for camera centering, distance, etc. Select the Initial view from the Sequences and Views dialog again, and then click the "**Use As Default**" button.

Any new view which is created from this point forward will use the same centering, distance, etc. as this one. Later, if you decide to change the default, all those cameras will automatically be adjusted.

Now would be a great time to use **File > Save**. In the next part of the tutorial, we'll create some scripts to control these animations, and make a web tour.

Ball in Box Tutorial, Part 2

Step 1: Sequence Clean-up

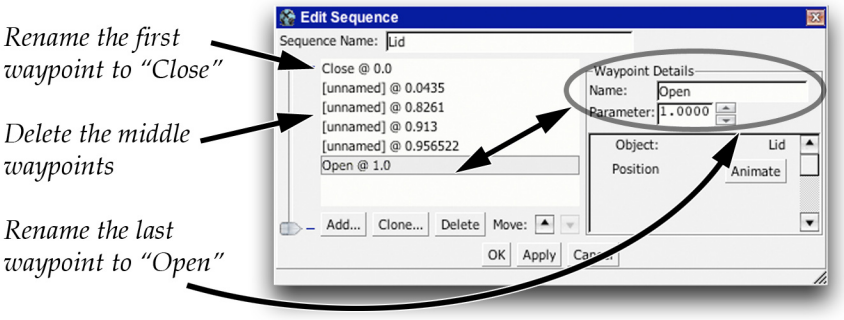
Use the **Windows > Sequences & Views** menu item to open the Sequences and Views palette. Find the sequence called "Lid" and click the Edit button to its right.

This opens a dialog which shows each waypoint of the sequence (waypoints can be thought of as keyframes). You can click on the individual [unnamed] waypoints to see the position represented (in the 3D View window.)

Once you have a waypoint selected you can use your keyboard arrow up and down keys to scroll through each of these waypoints. As you scroll through you can see the Lid open and close in the 3D View palette.

These 20 waypoints were created when Strata Design 3D CX saved the .xmm file out. However, only the first and last waypoints are really necessary to animate the Lid. Select the second waypoint, then click the **Delete** button at the bottom of the list. You'll want to click the Delete button 18 times – or until you just have the first and last waypoints remaining.

Now select the first waypoint. In the right side of the dialog, in the "**Waypoint Details**" section, change the waypoint Name to "**Close**".



Select the last waypoint. Change the waypoint Name to "**Open**". Notice that if you scroll down in the Waypoint Details section you can adjust the actual opening angle if you needed to.

Click the OK button to end editing the sequence waypoints. Notice that the Lid slider in the Sequences and Views palette still takes the Lid through its entire range of motion, and the pop-up menu to the right of the slider shows only two options, Close and Open.

Now click the Edit button for the Ball sequence. In this case, the intermediate waypoints are important, because they are not just linearly interpolating the first and last waypoints. In this case, we'll only name the first and last waypoints, since those are the conceptually important ones.

Select the first waypoint, and change the Name to "**In**".

Select the last waypoint, and change the Name to "**Out**". Click OK to close the waypoint editor.

Drag both the Lid slider and the Ball slider to the left to close the box and put the ball in the box.

Step 2: Create the Box Open Script

From the main palette, use the **Insert > Script...** menu command to create a new Script. We will not be appending any script to start with, so just cancel out of the initial "Append Script" dialog.

Next, select the **Lid** track in the Add Track window on the right side of the Scripts window. Click the Add button.

Notice that a small remote has appeared in the 3D View palette. Click the "**+1**" button on the remote twice, to make the new script two seconds long.

Right click the Lid of the box, and drag the Lid control to the outside of the control Disc.

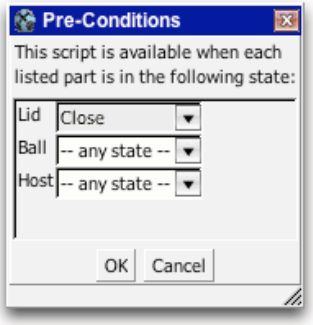
Notice that a **new event marker** was automatically created on the timeline at the two seccnd mark. Alternately, you could have right-clicked on the timeline, and used **Set To > Open** to set a event marker to open the box.

Click the **Play** button in the remote to see the script execute.

Click the **Rename** button in the Scripts palette, and name the script "**Box Open**".

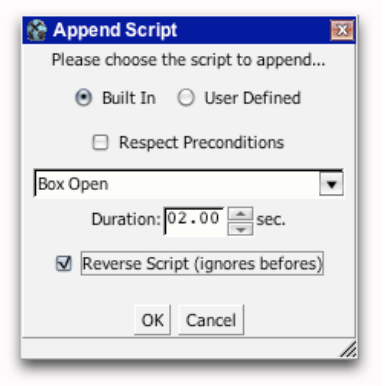
> **NOTE:** *By convention, scripts should be named by the part they operate on, followed by a description of what they do. This convention is assumed by the web export interface, to automate assigning scripts to control buttons.*

It really only makes sense to run the Box Open script if the box is Closed. This is called a **precondition**, and we should set the preconditions accordingly to facilitate user interface automation. Click the **Edit Preconditions** button, and change the Lid sequence to Close. This means that the Box Open script is only available when the Lid is Closed. Click OK to dismiss the dialog.



Step 3: Create the Box Close Script
Use the **Insert > Script...** menu command to create a new Script. This time we will start from an existing script: the **Box Open** script we just created.

In the Append Script dialog which opens, uncheck the "**Respect Preconditions**" checkbox to allow display of the Box Open script, regardless of whether the box is currently closed. Select Box Open from the drop-down menu.



Check the **Reverse Script** checkbox. This will append the Box Open script, only reversed. Click the OK button.

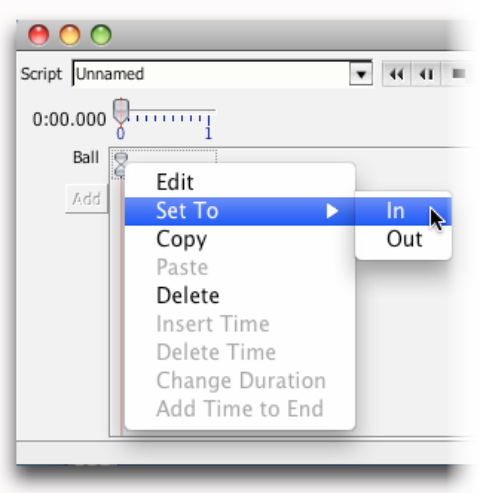
Notice that some built-in logic automatically comes up with a reversed name: In the upper left corner of the Scripts palette is the name for this new script – **Box Close**. Float your mouse cursor over the Edit Preconditions button, and notice that the preconditions are also automatically reversed (in order to Close the box, it must currently be Open).

Step 4: Preview the Scripts
Use the **Windows > Preview Scripts** menu item to enable the script preview palette. Only those scripts that have matched pre-conditions are enabled.

Click the Box Open and Box Close scripts to confirm that they work the way you want, and that they have the right pre-conditions (only one is enabled at a time!).

Step 5: Create the Ball Out Script
Use the **Insert > Script...** menu item to create a new Script. Cancel the Append dialog, and choose the **Ball** track from the Add Track section.

Right Click the first event marker on the Ball track, and choose **Set To > In**.



Click the " **+** " button twice. This button is located in the upper-right of the Scripts palette and just to the right of the Duration display - you may need to expand the Scripts palette.

You'll see that the timeline for this script is now two seconds. Right-click on the right-hand side of the script's timeline and select **Set To > Out** from the pop-up menu to create the second event marker. (Of course, you could have used the Remote in the 3D window, like we did for the box Lid.)

Click Rename, and change the name to **Ball Out**.

Click **Edit Preconditions**, and change the Ball precondition to **In**.

Before the ball can come out, the box needs to be open. Click the **Edit Befores** button. In the **Execute Before...** dialog, select Box Open from the list, and click on the **Add** button. Click the OK button. You've now set a "Before" condition for this script.

Step 6: Create the Ball In Script
Use the **Insert > Script...** menu item to create a new Script. Uncheck **Respect Preconditions**, select **Ball Out**, check **Reverse Script** then click OK.

The name and preconditions are set correctly, but as with taking the ball out, we need to make sure the box is open before we put the ball in the box. Click **Edit Befores**, then **Box Open** in the list. Then click the **Add...** button, and click OK in the Execute Befores dialog.

Step 7: Preview the Scripts
Use the **Windows > Preview Scripts** menu item to preview these new scripts. You'll notice that even when you get the box into a condition where the Lid is closed and the Ball is inside, you can still click on the **Ball Out** script. The system knows that it needs to open the Lid before it can move the Ball out – and it does just that!

Step 8: Generate a Web Tour
Create a new folder to hold this new web tour. Because web tours create a set of shared files you'll want to use a new folder for each new web tour you make to ensure that all the work you did to create scripts and more are unique to this saved tour.

Use the **Export > Web > Examine** menu item to create the web tour. Your browser should open automatically. If it doesn't open, find the .html file and open it manually.

You'll see that in your web tour there are four text based buttons in the upper left. The first two Lid and Ball buttons are the original scripted animations from the Strata Design 3D CX exported .xmm file.

You'll note that these two scripts don't have any preconditions or befores. The bottom two text buttons are the ones we created in this tutorial. Notice how these two buttons respect preconditions and befores.

Use **File > Save** to save your work. In the next tutorial, we'll adjust the size of the model, polygon count and tidy up the web display a bit.

Ball in Box Tutorial Part 3

If you're starting the tutorial from this point go to step 1 below. If you're continuing from Part 2 above, skip step 1 and start with step 2 below.

Step 1: Open the Model
Open the model "BallInBox3.xmm" from the Tutorial Files folder.

Step 2: Dealing With Excess Triangles
Use the **View > Triangle Counts** menu item to show triangle counts in the hierarchy view.

There are a lot of unnecessary polygons that we can easily eliminate. The box sides each are made up of only two triangles – pretty efficient. However, the Ball contains **3,968 triangles** – way too many for the needs of this simple demonstration.

First we'll get a better look at the ball and its triangles. If the Ball isn't currently visible, select **Windows > Preview Scripts** then click on the **Ball** button.

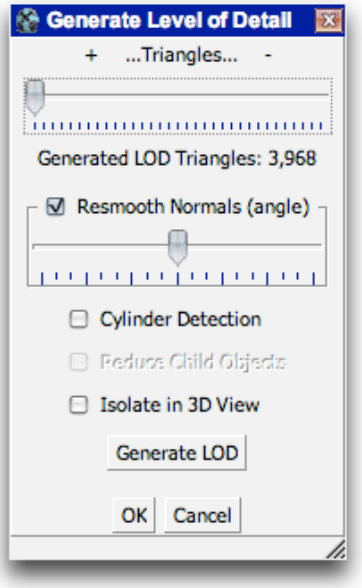
Or, you can right-click on the Lid in the 3D View window to summon the Sequence controller. Open the Lid, then use the same process to take the Ball out of the Box.

Next, select **View > Wire Frame > On** to see the edges of the triangles. You can see that the entire exterior of the Ball is overly tessellated (triangulated). This is easily remedied using the Generate LOD feature, which we'll do next.

Step 3: Generate LOD

The Master Model format used by Live 3D allows the same object to be represented at several levels of detail, or "LOD"s. The lowest level of detail is used for all real-time applications, while the highest is maintained for future use, such as increasing the detail for additional projects (such as a technical manual) or for creating even lower LODs, should you discover that you weren't aggressive enough in decimating (removing) polygons for the web.

For the Ball, we'll do full LOD generation pass, which will eliminate unnecessary polygons while still maintaining the spherical shape of the Ball. Right-click the word "Ball" in the hierarchical view in the main palette and choose **Generate LOD** from the pop-up contextual menu.



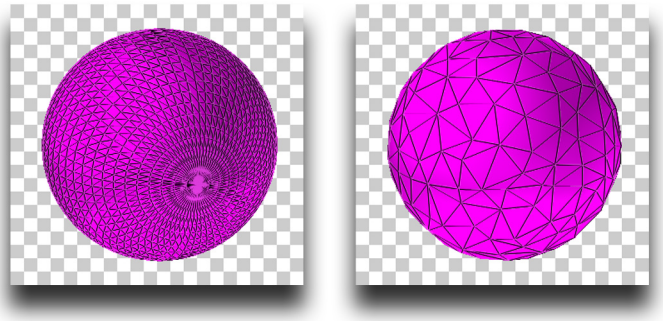
Now, click on the **Triangles** slider at the top of the dialog to make it the active slider in the dialog. Now you can use the right arrow key on your keyboard to nudge the slider. Nudge it three moves to the right, then click the **Generate LOD** button on the dialog. Notice that the polygon count drops immediately to **2,230** triangles (visible just under the slider). A substantial drop, but we're going for more here.

Use your mouse to drag the Triangles slider all the way to the right and click on **Generate LOD** again. The polygon count now drops all the way down to **386** – less than **10%** of the original **3,968**.

If you slide the Generate LOD dialog out of the way, you'll see that the sides still have two (2) triangles each, but the Ball displays:

Ball (386 / 3868) - 386 in the lowest LOD, 3,968 in the highest

Before **Generate LOD** *After* **Generate LOD**



This is a good opportunity to play with another control in the Generate LOD dialog. Try moving the **Resmooth Normals** slider all the way to the left, then click **Generate LOD** again. You'll notice the Ball appears pretty rough. You'll want to put the slider back to about the middle and click **Generate LOD** again.

With some models the default **Resmooth Normals** setting may create some odd lighting effects. In that case you may need to slide this control to the right some to increase the angle on which the LOD setting creates smoothing, and therefore, creating a more natural appearing surface.

Click OK to finish the Generate LOD process.

Step 4: Adjust Dimensions

Most 3D modeling programs work in arbitrary units that have no particular relationship to real-world units like inches or meters. The VRML format (which is used for interchange between many 3D modeling programs and Live 3D)

recommends that units of 1 meter be used. However, this convention is rarely followed.

Even when using Live 3D you may want to set up a custom dimension to ensure that your model conforms to client expectations. To adjust the dimensions displayed by the measure tool in a web product tour, we need to find the relationship between internal model units and real-world units.

Suppose we know that the Ball is meant to be 8 inches in diameter. Select the Measure tool in the 3D window, and click and drag from the top of the ball to the bottom. It will show the current measurement.

Select the **Edit > Dimensions** menu item. At the top of the dialog is the overall scaling factor. It gives the relationship between native model units and real-world units. For example, if you work in a CAD program that models everything in centimeters, and that program just outputs native units to VRML exports (which is typical) then the overall scaling should be 1 cm. But for this model, the chances are pretty good that you have no idea what the scaling factor should be.

More likely, you know the actual size of an object in the scene, and so you can use that to determine scaling. In this case, we know that the ball is supposed to be 8 inches in diameter. Change the drop-down at the top of the dialog to use "inch" as the units.

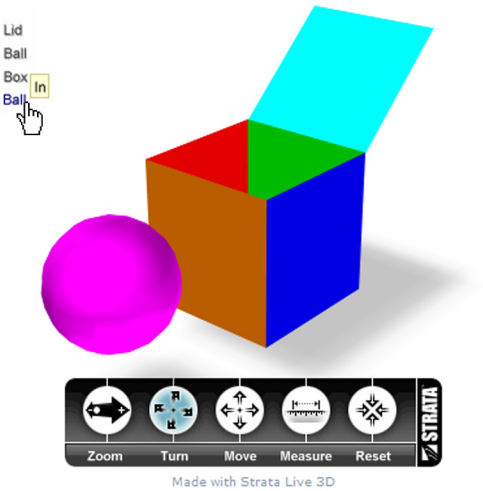
Now click on the up or down adjustment arrow to the right of the Height field. As you drag this control you will see the measured height displayed in the **3D View palette** also changes. Keep dragging this control until the displayed height comes close to the 8 inch target.

You'll notice that the other values (width, depth, and overall) change automatically, to correspond to the changes you made to the Height field. Click OK to lock in the change.

Step 5: Export Web Tour

Use the **Export > Web > Examine** menu item to create a web tour. Select an empty directory to hold the files, and name the output file **BallInBox**.

Your web browser should open automatically and display the tour. If it doesn't, open the folder, then open the generated html file.



Obviously, there is much more that can be done to customize buttons, add pop-up text labels – the possibilities are endless – especially when you take into account the ability to edit the XMM file and the Meson code.

Creating Custom Navigation Bars

Creating custom web tour Navigation Bars to match your website design, or your client's colors, or your model theme, or – you name it – is possible for users with a little graphic arts talent and access to painting software, such as Photoshop.

The Teal-Blue Translucent Navigation Bar

Though Live 3D offers complete control over designing your interface elements by utilizing the Meson programming language, for this tutorial we'll take an easier approach. In this tutorial we'll customize an existing controller from the Web Templates folder in your Live 3D folder.

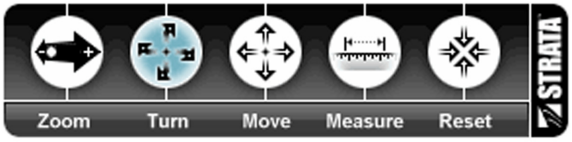
Step 1: Select a Template

The first step is to select an existing Navigation Bar. You'll want to choose the one that comes closest to the look and size that you want. If you haven't already done so, test out all the available templates.

To do this, just use a simple model such as the Saber Dino that we used for the quick start tutorial in Chapter 2. The Saber Dino can be found in your Strata Live 3D CX 2 folder, in the folder named Tutorial Files. Use the File > Import > VRML 2 command, and select Saber Dino.wrl.

Once you have Saber Dino loaded, choose **Export > Other > Examine (Choose Nav Bar.)**. The first dialog will ask you to choose a name and location to save the Saber Dino to. The next dialog you see will be the **Select Design Template** dialog asking you to choose from a list of Navigation Bar web templates.

As you test these templates, you'll want to save each version in its own folder to avoid overwriting files that are necessary for each version of the Navigation Bar. Once you've had a chance to look at and use all the templates that come with Live 3D, you'll have saved versions of each template in a working web model. This will be useful for future projects.



Not to stifle your creativity, but for this tutorial we'll use the controller named **strata_large.jar**. This Navigation Bar, as the name suggests, is larger than some of the others templates. This will give us a little more pixel real-estate to work with.

Step 2: Make a Copy of the Template

When customizing these templates, you'll want to make sure you keep the original file around. Make a copy of strata_large.jar by opening the Web Templates folder. Select strata_large.jar, go to your system Edit menu and select Copy. Now paste a copy of the file back into your Web Templates folder.

Step 3: Convert the JAR File

As discussed earlier in this User Guide, the file extension ".jar" simply stands for **Java Archive**. As an archive, it contains a series of files that are necessary to create the Navigation Bar. The JAR file is assembled and compressed with a very familiar compression technology – ZIP.

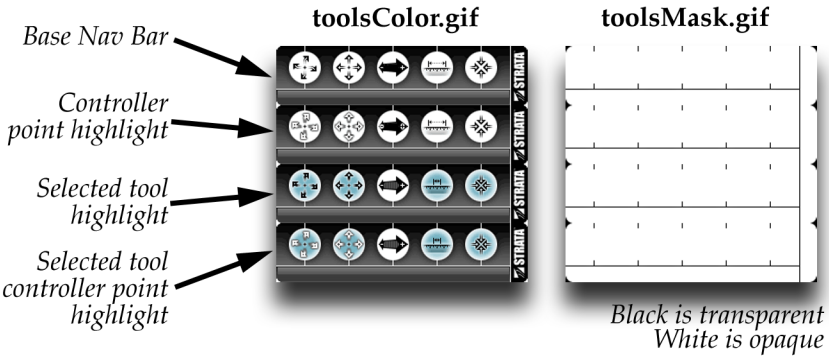
To open the template as a .ZIP file, rename the copy of strata_large.jar that you made in Step 2 to now be **MyTemplate.zip**. Now "unzip" the file with a ZIP compression utility. It should unzip into a folder named MyTemplate. Now you're ready to start editing.

Step 4: Open the GIF Files

In the folder MyTemplate, you'll find a series of .gif image files and a text file named template.txt. For right now we're only going to concern ourselves with two of the .gif files: toolsColor.gif and toolsMask.gif.

> **NOTE:** *For the purposes of this tutorial, the painting application being used will be Adobe Photoshop – but any competent painting software should be able to do the job.*

Open these two .gif files in Photoshop. As the file names suggest, one image contains the color versions of the controller and the other contains the mask, or alpha, for the controller.



Both the color image and the mask image are divided into four sections. The top section is the default/rest state of the template. The second section down provides the highlights for each controller point for the non-selected tool. For example, if you mouse over the move-left arrow on the Move controller, even though it's not selected, the small arrow will highlight. If you click on that same arrow, the Move controller will become "selected" (indicated by the highlight from the third section of the color image). The fourth and final section provides the highlights for each controller point, combined with the highlight for the full controller.

Step 5: Edit the Color Image

We're going to keep our edits pretty simple for this tutorial, but you're probably already chomping at the bit to get creative. First, let's work on the toolsColor image. In Photoshop, choose **Image > Adjustments > Hue/Saturation**. We'll go teal-blue on this one. Click on the **Colorize checkbox**. Now put each slider in the center position – about 180 for the Hue slider, 50 for the Saturation slider, and 0 for the Lightness slider.

Now save the file. That's it. You now have your gif image in your MyTemplate folder.

Step 6: Edit the Mask Image

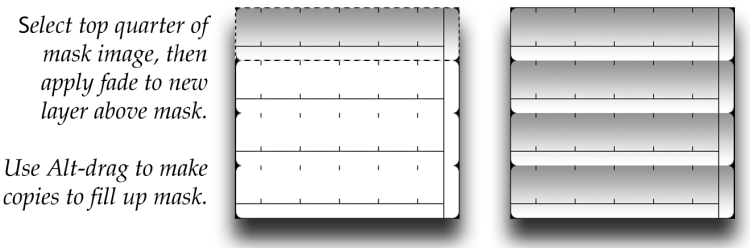
Now bring the **toolsMask** image to the front in Photoshop. As you're probably aware, the way the mask image works is that dark areas are used to make the color image transparent. The white area makes the color image opaque. What this mask image doesn't have is any gray. Let's add some semi-transparent areas to this Navigation Bar.

First, change the color mode of the image from **Indexed to Grayscale**. Do this by selecting the Photoshop menu command Image > Mode > Grayscale. Now you're able to edit the image.

If you check the dimensions of the image you'll see that it's **290** pixels wide by **272** pixels tall. What we'll do is make each of the **four quadrants** the same, so we'll work on the top quarter first, then copy that portion and replicate it three times. The **272** pixel height can be divided into four equal chunks of **68** pixels.

Alter the Photoshop marquee tool to 290 pixels wide by 68 pixels tall. To do this, select the Rectangular Marquee Tool from the Tool palette. Next, select Fixed Size from the pop-up menu in the tool Options bar. Enter 290 in the Width field and 68 in the Height field.

Next, click in the upper left of the mask image. This will select just the top quarter of the image. Now make a new layer to paint on. Set your colors to about a 50% gray for the foreground and white for the background. Now, choose the Gradient Tool and do a gray-to-white fade. Set the Layer Blending Mode to Darken. Copy and paste this fade until you've covered all four quadrants.



Step 7: Save the Mask GIF

This time when you save the image you need to use the Save For Web command in Photoshop. The reason for this is that we changed the mode of the

image and added a layer. The GIF format does not support these elements so, unlike the toolsColor image, you cannot just select save.

When you select **File > Save For Web** you get special dialog for saving images like JPEGs and GIFs. For this project make sure the format selector is set to GIF. Set the Colors field to 16. This will cause some banding, but since this image will only be used for transparency levels, that won't really be noticeable. Save the file into your MyTemplate folder and replace the previous image named toolsMask.

Step 8: Create the JAR File

Now you're ready to compress the files back into a .jar file. Select all the files in the MyTemplate folder. Make sure you do not compress the MyTemplate folder – just the contents of the folder. After the file is compressed, rename it MyTemplate.jar. Now place the template in with all your other templates in the Web Templates folder.

Step 9: Test Out MyTemplate

Go back to Live 3D. Take any test model and do an **Export > Other > Examine (Choose Nav Bar)** command. Remember, the first dialog you get in this process is to name your model and to locate a place to save it. After you save the model, the next dialog should automatically bring up the Web Templates folder with MyTemplate in with all the others. Double-click on MyTemplate.

You should see your test model come up with your new template creation, looking something like this:

Notice how the color has changed and that the template is semi-transparent, getting progressively more opaque towards the bottom. This is, of course, a result of the grayscale fade you created.

You can see the potential for creating and modifying the available web templates. One note for the code-minded among you, the text file you saw in the uncompressed MyTemplate folder (**template.txt**) is the Meson code that controls the behavior of this Navigation Bar. When you want to delve into a high level of customization, this is the place to start.

Using XML for Targets with Pop-Up Text

One of the powerful things you can do in the XML code is to add **targets** in 3D space that can launch other activities, such as scripts, material changes and pop-up text notes to label parts or provide instructions for the viewer. Below is a short tutorial showing how to add pop-up text notes.

Tutorial: Saber Dino Text on the Nose

In this tutorial we'll use **XML** to create a **target** on a 3D object. The XML code will tell the player to display some pop-up text when the target is clicked on.

Step 1: Open the Saber Dino Model

We'll be using the same Saber Dino VRML file that we used for the quick start tutorial, found at the beginning of this User Guide. The file can be located in your Strata Live 3D CX 2 application folder, then inside the Tutorial Files folder. Drag and drop the file named **Saber Dino.wrl** onto the main Live 3D palette.

Step 2: Gather the Target Information

Use the **Windows > Log** menu item to ensure the Log palette is showing. Next, select the **Progress Messages** button at the top of that panel.

Now, hold down the Shift key and click on the Saber Dino's nose. You may need to rotate him first to get a clear shot at his nose. You should see something close to the following:

Picked object ID ORITGT at local coordinate 0.5353206,0.1344095,-0.13964817

You'll note that the information is pretty hard to make sense of. In the first place the name is a bit strange (ORITGT?). Let's try changing that name and see where that gets us.

In the main palette, right-click on the last object in the hierarchy (ORITGT). Now select the third item in the pop-up context menu: **Rename**… A small dialog named **Rename ORITGT** will pop-up. Delete ORITGT from the text area and type in **Dino**. Now try shift-clicking on Saber Dino's nose again in the 3D View palette. What do you see in the Log palette now? **You're right, the same thing!**

The reason the name in the Log palette is still the same is because the name we changed was only the description (or desc in XML Master Model talk). The **true ID** continues to be ORITGT in the **XML code**. You can change this by opening the XML file. Let's do that now. First, select **Edit > XML** from the main menu. When the Edit XML dialog opens, you can find the following text **eighteen lines down** (about halfway from the top when you first open the Edit XML dialog):

```
<object id="ORITGT" desc="Dino" private="true">
```

Change "ORITGT" to "Dino". Click OK on the Edit XML dialog. Now, when you shift-click on Saber Dino's nose, you'll see:

Picked object ID Dino at local coordinate 0.5353206,0.1344095,-0.13964817

Though that worked, it was quite a hassle locating and editing that name in the XML file. There was no "search" function we could use, no edit menu – overall, it's a pretty simple text editor. In the next XML edit we'll use a much better text editor.

Step 3: Save As XMM
Now we'll use the method outlined at the beginning of the section **Editing the XML File** to break the XMM model file into its component pieces.

Select **Save As...** from the File menu. Navigate to the place where you'd like to save the model data. You might want to create a new, empty folder. To do this, you can click on the folder icon with the red spark on it, which can be found in the upper right of the Save dialog. Give the folder a descriptive name, like "**Dino on the Nose**". Now open your new folder.

For this special trick of saving the unpacked Master Model, you need to name the file you're saving **MASTER.XML**. Make sure you use the file extension **XML** and **not XMM**. Only MASTER.XML will create the unpacked file we're after. Now, from you computer system, navigate to the "Dino on the Nose" folder and open it up.

Step 4: Open the XML File
When you open the "Dino on the Nose" folder, you'll note that there are a number of files in this folder. One is a JPEG file, which is the UV based texture map. The file we're interested in is the one named MASTER.XML. If you're working on Windows, right-click on the XML file and select **Open With > WordPad**. If you're a Mac user, the likely choice to use is **TextEdit**.

Once you have MASTER.XML open, we're ready to make some more edits.

Step 5: Insert Some XML Code
Now we're ready to add our target. First do a search (should be in the edit menu: **Edit > Find** of your text editing application) and look for **</scripts>**. The **" / "** defines the end of a segment of code. In this case, it represents the end of the block of **script** code. You'll find **</scripts>**close to the last line in the XML file.

The **target** code we'll be inserting will go after the end of the script section but before the end of the entire master file (**</master>**). Insert the following text:

```
<triggers>
 <trigger desc=”Text you want to\nhave pop up”
    id=”trigger1” object=”Object1”
    radius=”1” x=”1” y=”1” z=”1”>
 </trigger>
</triggers>
```

That’s a good starting point. Your XML code should look like this at the bottom of the text editing window now (but without the left-hand side numbers):

```
  </scripts>
1.  <triggers>
2.    <trigger desc=”Text you want to\n have pop up”
3.     id=”trigger1” object=”Object1”
4.     radius=”1” x=”1” y=”1” z=”1”>
5.    </trigger>
6.  </triggers>
  </master>
```

If you don’t have the fancy indented formatting, don’t worry about that as it has nothing to do with how the XML code executes in the Live 3D player.

Step 6: Get to Know the Code

Let’s review what the code means that you’ve inserted. The first line:

```
<triggers>
```

indicates the beginning of your triggers list. The next line:

```
<trigger desc=”Text you want to\n have pop up”
```

is your first trigger (and in this example, the only one). This line includes what to do when the trigger is clicked on: provide a description with text. The text is enclosed in quotes.

NOTE: Notice that the quotes are not **“**fancy**”** quotes, but rather standard, **“**simple**”** quotes, where both are identical to each other. The XML code must be

simple text or Live 3D will not accept the Reload command. You may need to open the Preferences of your text editing program to check this.

Within the quotes is a basic string of text – but with a "soft return" inserted in it. This is the "**\n**" you see between **to** and **have**. You can use as many of these are you like, or none at all.

The third inserted line:

```
id="trigger1" object="Object1"
```

provides the ID for the trigger ("**trigger1**") and the name of the object that is subject to the trigger (**object="Object1"**). The **id** attribute can be anything you choose, just make sure each trigger has a different one – if you add multiple triggers.

The fourth inserted line:

```
radius="1" x="1" y="1" z="1">
```

provides the size and location of the target. The radius attribute is the size of the sensitive area in native model units. The x, y, and z attributes give the location of the center of the hot area, relative to the object.

The last two inserted lines (the fifth and sixth lines):

```
</trigger>

</triggers>
```

indicate the end of the end of the trigger you created and the end of the triggers section.

Step 7: Customize the Trigger Code

Now it's time to make this trigger code work for our Saber Dino model. The first thing you need to do is to edit the pop-up text string so it says something that works for our project. How about:

```
<trigger desc="Right on the Nose!"
```

Next, input the correct target object name:

```
id="trigger1" object="Dino"
```

Finally, we need to input the correct target numbers. This is where the Log palette information comes into play. If you recall, you get this information by shift-clicking on the nose of Saber Dino. You should see numbers like this:

Picked object ID Dino at local coordinate 0.5353206,0.1344095,-0.13964817

You can see that this log information also includes the proper object name that we edited early in this tutorial. Input the correct numbers:

radius=”1” x=”0.54” y=”0.13” z=”-0.14”>

There are a few things to take note of here. Even though it’s not labeled, the coordinate location data feedback from the Log palette comes in the same order that the XML target code wants it; **X, Y then Z**.

The next thing to note is that we didn’t need to use the full seven digits of accuracy from the Log palette. The above numbers have been **rounded** to the closest number with **two digits of accuracy**.

The third thing to think about is the radius size. In native units, the target numbers are **very small**. This tells us that the radius of our target should probably also be a very small number. **Let’s try 0.1** and see how it works:

radius=”0.1” x=”0.54” y=”0.13” z=”-0.14”>

Now save the MASTER.XML file from your text editor.

Step 8: Reload the XML File
From the Live 3D main palette, choose **File > Reload XML...** The Open dialog will display. From the dialog, navigate the “**Dino on the Nose**” folder and open it. Select the **MASTER.XML** file then click on the **Open** button. The XML file will now be reloaded.

If you made any mistakes when editing the XML file, the **Log palette** will display the errors. Make any necessary corrections to the XML file from within your text editor, save, and then reload the XML file until you get a clean reload.

Step 9: Test it Out
Export your web tour by choosing **Export > Web >Examine.** Save the web tour in a new, empty folder. Once you’ve saved the tour it should automatically open in your web browser. (If it doesn't, open the html file manually. It should look something like this:

When you export the model, the exporter will write extra code into the generated HTML page to create the hotspot.

The appearance of text pop-ups is controlled by the user interface template, such as **strata_large.jar**. You can open this file using WinZIP, and edit the Meson code in the template.txt file to change attributes such as text buffer color, or font style.

If you'd like to change the ⓘ icon you can follow the same basic instructions in the Creating Custom Navigation Bars tutorial above. Just use your favorite paint application to edit the GIF files that represent that particular icon.

For full documentation of triggers see the Master Model Format Spec. by clicking on the Live 3D Help menu and choosing **Master Model Format.**

Appendix

Troubleshooting and Support

Support from Strata

Email Support

Strata provides email-based technical support that is second to none. Send your questions to support@strata.com.

Strata.com Support System and FAQ

The Strata website has a complete support section that includes information about updates, registration help, available training and an FAQ (frequently asked questions) system.

To access our web-based FAQ support system, point your browser to **http://support.strata.com/** and choose the app you want support for (in this case, Strata Live 3D CX 2). You can search through support issues that have come up in the past, or submit a new question here. Our support staff will respond to your issue online, and you will receive an email when your issue is updated. This helps us keep all support information in one, easy to search location online for all users.

Training Materials

Check with Strata about new and updated training materials.

Training Classes

Strata offers training classes taught by Strata certified trainers. Check with us to find out about class schedules, or to request a class. You can also arrange to have an instructor come directly to your location for in-person, one-on-one training.

StrataCafe.com

StrataCafe (www.stratacafe.com) is the official user community for Strata users. At StrataCafe you'll find a place to post test web tours and get feedback from professional artists, gain access to free models, custom Navigation Bars and textures, and join in the discussion forums to get answers to everyday

questions about using your Strata software. You can even get answers to basic design questions.

Program Memory

Warning: Propeller Heads Only
Live 3D is configured, by default, to use up to 800 MB of memory. If this amount of memory is not sufficient (for example, when opening a Master Model with 1 GB of texture), it's possible that the program can fail without warning. If this happens, a log file will be left in the **Logs** folder which can be found in your Strata Live 3D CX 2 install folder.

To configure the program to use more memory, edit the file called **Master.lax** in the Program Files/Strata/Live 3D CX 2 folder where Live 3D CX 2 is installed. The line that reads:

lax.nl.java.option.java.heap.size.max=828860800

controls the maximum memory usage. The number must be expressed in bytes (1MB = 1048576 bytes). Note that configuring the editor to use more memory than physically exists on your computer will lead to very poor performance. Also, desktop versions of Windows may prevent the application from using more than about 1.2 GB of memory.

If you are working on a model which requires more memory than you have available, see the menu item: **Special > Unlimited Texture Memory**.

Common VRML Import Issues

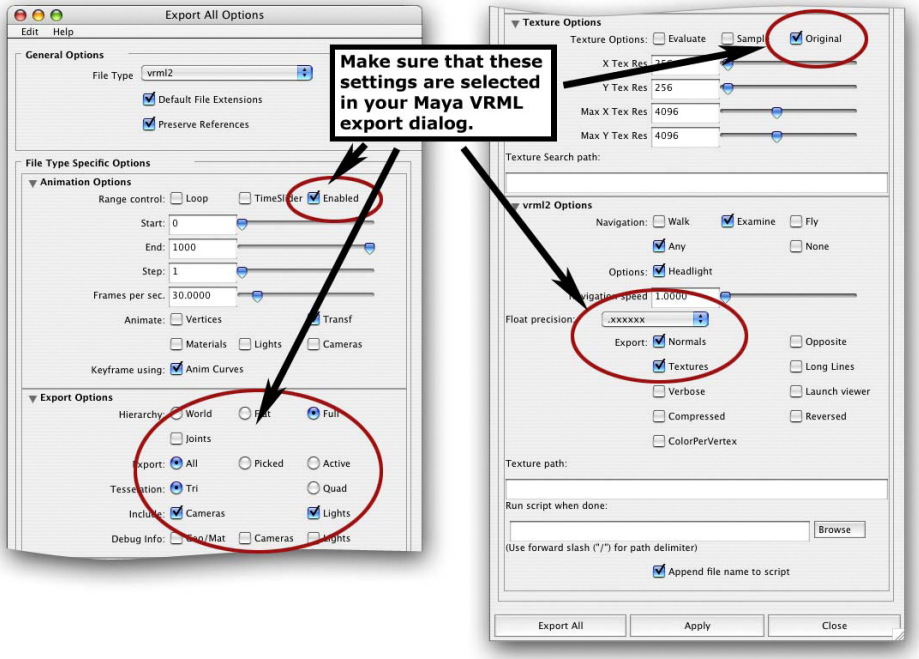
Some VRML exporters turn the model 90 degrees on export. To correct this, right-click on the **ROOT** object in the main palette, and select **Edit Object**. Put the value **–90.0** in the Orientation **Y** control (or whichever control fixes the problem). Next, use **Windows > Sequences & Views**, to show the Sequences and Views palette. Select the Initial view in the drop-down menu at the top-left of the palette, then click **Change View Definition**. Select the **Advanced** tab, and click the **Center of Visible Scene** button to re-center the model with its new orientation.

Exporting VRML from Maya

The "vrml 2" export function in Maya is not enabled by default. In Maya, use the menu item **Window > Settings/Preferences > Plug-in Manager…** to open the

plug-in manager. Scroll to the bottom, and check both **load** and **auto load** for **vrml2Export.mll**.

To export VRML97 files, use **File > Export All** and select the dialog. Then adjust the settings to match those shown here:



VRML Export from Max

Note that if you are importing models from 3D Studio Max, a MAX-Script is available for that program which improves upon the VRML export built into that program. The script generates ancillary information about **Animation Key Frames** and **Smoothing Groups**, which are not included in the MAX VRML export function by default. Click on **Help>Extras** to access this script.

Optimizing Large 3D Models for the Web

This section reviews the technologies and processes Live 3D uses to produce the smallest projects possible.

3D models are among the most complex kinds of data to transmit efficiently. A comprehensive web optimization solution requires **Decimation**, **Compression**, and **Streaming**. Failure to address any one of these areas, even in part, can make an otherwise good approach extremely inefficient.

Decimation is a "lossy" process, in which high-resolution data, which is not required in a web application, is removed. Compression is the process of representing a large data set using a smaller data set, by exploiting patterns or other kinds of predictability in the data. Streaming is a technique used to send data while the user is looking at the running application, to reduce the perception of delay. These three techniques apply across three domains of technology: Authoring Tools, Formats, and Viewers – as shown in the following chart:

Authoring Tools	**Formats**	**Viewers**
Decimation of:	Compression of:	Compensation through:
Polygonal Mesh	Hierarchy & Animation	Decompression
Hierarchy	Topology	Sharpening
Objects	Geometry Coordinates	Normal Reconstruction
	Mapping Coordinates	Streaming of:
	Vertex Normals	
	Texture	Objects

	Decimation of:	**Streaming of:**	
	Coordinate Tables	Geometry	
	Coordinate Values	Texture	
	Texture		

As this chart shows, aspects of decimation and streaming apply across technologies, requiring support beyond a single technology. For this reason, and because of the interplay between all these aspects of efficient data

transmission, a solution which includes tools, formats, and viewers, all working in harmony, will generally produce the best results.

Each of these aspects of efficient transmission will be explained in the following sections.

Decimation

Decimation is the process of eliminating unneeded information from the 3D model. It is a "lossy" process, which means it must be guided by knowledge about the end-user requirements of the data. This knowledge comes from several sources:

Developer Input

You, as the developer, select parameters based on your understanding of end-user requirements.

Viewing Platform Limitations

By making the software aware of limitations (such as maximum zoom) of the viewing platform, it can eliminate data which would not be visible to the end-user.

Behavioral Analysis

By making the software aware of the behavior of the 3D model, it can eliminate data which will not be relevant for a given application.

A 3D model is generally represented by a "scene graph," in which a hierarchy of transform nodes tie together various parts. At each of these nodes, there may be geometry. There are many parts of this graph which may be decimated. The next sections discuss each of the candidates.

Mesh Decimation (Polygon Reduction)

Tessellated 3D models often have more triangles in each mesh than are really necessary for a given end-user application. In some cases, such as co-planar polygons, this decimation requires no technician input; but in general, you will need to make quality determinations to decide how aggressively the system should remove polygons from the tessellation.

Live 3D uses a quality-driven approach to decimation. Rather than giving an exact polygon count goal, which is impossible for the you to know in advance, the software is given an abstract quality metric, and the reducer will eliminate as many polygons as possible without dropping below that quality level. This allows you to work on large hierarchies of objects at a time, and then do fine-grained adjustments to the decimation as needed.

Hierarchy Decimation (Merging Nodes and Meshes)
3D scene graphs often have far more hierarchy than is necessary for an end-user application. For example, an Alias Studio model of an MRI machine had about 3000 nodes in its hierarchy, but only about a dozen moving parts. Analogous to automatic "inlining" in a compiler, Live 3D will analyze the motion and visibility operations actually used in an application, and identify the levels of hierarchy that are irrelevant to animation. It can then decimate these out of the scene graph, apply the necessary transforms, and merge child node mesh data.

Coordinate Table Decimation (Welding)
Triangular meshes are generally represented using tables of coordinate values (3D positions, vertex normals, and texture mapping coordinates). Often these tables will contain values which are duplicated, or very close to duplicated. This redundant data can be decimated through a "welding" process, in which values which are within a defined threshold are unified. The maximum threshold to use can be determined with knowledge of the resolution limitations of the end-user application. However, placing this value under your control allows the use of a more aggressive weld threshold to further reduce model size.

Coordinate Value Decimation (Quantization)
3D scene graphs generally use floating-point representations for all coordinate data (positions, normals, and mapping coordinates). However, floating point data is extremely difficult to work with in compression, so this data will first be quantized into an integer representation for subsequent compression. Quantization is a kind of decimation, because it effectively decimates the least significant digits of each coordinate value. The choice of the number of bits to use for each integer might be determined through statistical analysis of the dynamic range, and variance, of the sample data. However, again it is best to leave this under your control, since an algorithm cannot effectively determine which variance is noise, and which is actually important geometry.

Texture Decimation (Cropping, Down-Scaling, Noise Reduction)
For many classes of 3D scenes, the texture data can dwarf 3D geometry. Photographic based processes can produce models with a hundred megabytes of texture. This texture data must be aggressively decimated as well. Three approaches are used by Live 3D to get the number of pixels down to a reasonable level: cropping, down-scaling, and noise reduction.

First, the texture coordinates used by the meshes are analyzed to determine which image pixels are actually mapped to triangles, and unused pixels are cropped out of the image (either by reducing the rectangular boundary of the image, or by replacing these pixels with an average color value).

Next, the images are scaled. By default, Live 3D uses a quality-based approach to scaling images. The image is scaled down as much as possible, without dropping the quality of the image below a threshold (relative to the unscaled original). Using this approach, a largely uniform texture might be scaled down a lot, whereas a highly variable texture will be scaled very little. In addition to this quality-based approach, you can choose individual scale factors directly, for more optimal reduction.

Finally, under your control, the images may be noise-reduced. Noise reduction is a common data pre-conditioning technique used on image data, to ensure the compressed image is as small as possible. For example, in the Save to Web feature of Photoshop, applying a Gaussian blur is an option in the JPEG compression step. Of course, Live 3D uses a more sophisticated noise reducer than simple Gaussian blur.

Both noise reduction and scaling can make images look blurry, so it is often desirable to augment these techniques with a post-decompression sharpen filter in the viewer, to re-introduce much of the original clarity of the image.

Object Decimation (Invisible Node Removal)

Object decimation is analogous to dead-code removal in a compiler. By performing static analysis of the potential dynamic nature of a scene graph, the software can determine that some parts will never be visible in the final application. These objects, and texture images used by these objects and no others, can be dropped from the scene.

Compression

After decimating out as much data as possible, the remaining data must be effectively compressed. Live 3D uses a proprietary technique that we call Dedkov compression. Here, we discuss the kinds of data that must be compressed, but we do not get into the details of our proprietary approach.

Hierarchy & Animation Compression

After Decimation, there is usually not much hierarchy left to compress, and animation information is generally fairly small to begin with, so ordinary ZIP-style compression is adequate for this data.

Topology Compression

The topology of the mesh describes how the various 3D coordinates are connected together into triangles.

Geometry Coordinate Compression

The geometry coordinates give the exact 3D location of each vertex in the mesh.

Mapping Coordinate Compression

Mapping coordinates dictate the method by which 2D image maps should be overlaid onto the geometry. As 3D modeling techniques evolve, more and more maps are being applied to geometry (diffuse, bump, displacement, etc.), so any technique should support multiple mapping coordinates per vertex.

Vertex Normal Compression

Vertex normals make up a large part of the data to be transmitted, so special attention is often paid to compressing this data. However, for almost all tessellated models, the vertex normals can be easily calculated by averaging some of the face normals of triangles adjacent to each vertex. Exactly which faces to include in this calculation can be encoded using a technique called "smoothing groups." In some cases, the smoothing groups will be available in the source data, because they were used in the modeling process to drive surface normals to begin with. In other cases, they must be computed by analyzing the normals. Encoding smoothing groups is a far more effective compression technique than any other option for vertex normal compression.

Texture Compression

For many models, texture image data will be many times larger than all other data combined. Thus, any comprehensive solution to compression must focus on texture compression as well. There are two classes of lossy image compression, characterized by the familiar JPEG and GIF approaches. However, these formats are quite outdated, and there are better alternatives for both, as described below.

Lossy Frequency Domain Image Compression

JPEG is the dominant image format which uses lossy frequency domain image compression. In this technique, color information for blocks of pixels is transformed from the amplitude (intensity) domain, into the frequency domain, filters are applied to remove high-frequency changes, and the filtered data is encoded.

A modern technique which works similarly, but produces consistently superior results, is wavelet compression. The JPEG-2000 standard is an example format for wavelet compression. Live 3D uses a proprietary wavelet-based image compression technique, which is similar to JPEG-2000 but has a much smaller decoder footprint, so it is practical to use in a Java applet.

Paletted Image Compression

For certain kinds of images, such as screen shots, JPEG-style compression requires very large files to produce acceptable quality. For these images, it can be beneficial to use a paletted compression technique instead. In this approach, a palette of colors is built for the image, and each pixel uses a color from this

palette. GIF and PNG-indexed are popular formats which use this technique. Live 3D uses a proprietary technique which achieves dramatically better compression than these formats for paletted images.

Streaming

After decimation and compression, a hundreds-of-megabytes data set may have been reduced to hundreds-of-kilobytes. While 1000:1 compression is admirable, files spanning hundreds of kilobytes will still take a long time to load over most Internet connections. To reduce the perceived delay, some form of streaming is often desirable.

The exception to this is cases, like PDF, where the usual user paradigm is to download, then view. For formats like that, using a streaming mechanism is pointless, and probably counterproductive, since the streaming algorithms will undoubtedly make it take longer to load the 3D model.

But for web-based applications where streaming makes sense, there are a few variations to consider: streaming objects, geometry, and/or texture. They are examined in the next sections.

Object Streaming (Instancing)

Object-level streaming is an application-specific optimization, which has nothing to do with the decimation, compression, or file formats used to transmit data. A good example of object streaming would be a product catalog that only loaded 3D models selected by the user, instead of loading all the 3D models in the entire catalog and selectively changing visibility of individual models. Clearly, in a case like this, object-level streaming is a requirement. But all that it requires is that each viewable object be stored separately (or at least clearly indexed within a larger file), and that viewer logic be included to download the visible parts as they are needed.

Geometry Streaming (Progressive Meshes)

A great deal of research has been devoted to streaming geometry data, and it is the primary claimed benefit of the U3D ECMA standard. However, we have elected to omit this kind of streaming from Strata solutions for two reasons. First, it is not necessary. After decimation and compression, the geometry component of a model is rarely more than a few tens of kilobytes. For example, with a typical compression rate of 8 bits per triangle, a 50,000 triangle CAD model (which may have been decimated down from 500,000 triangles) will only be 50KBytes. For models created with 3D visualization tools, polygon counts exceeding 20,000 are rare. Adding the complexity of streaming geometry to change the user experience during the first 5 seconds of viewing hardly seems worth the trouble.

However, if geometry streaming had no down side, it might be worth doing anyway. But the downsides, are, in fact, huge. First, progressive meshes cannot be efficiently compressed. In addition to all the data which already needed to be encoded, the rules to migrate the initial, low-resolution mesh, to transform it into the final high-resolution mesh must also be encoded. This vastly increases the entropy of the system, resulting in much lower compression ratios.

Second, unpacking progressive meshes takes a lot of computation. Thus, the user may be seeing a progressively improving visual appearance, but there is no opportunity for the user to interact with the lower resolution data, because the CPU is spending all its time decoding the data and applying the progressive mesh transforms. For large data sets, splitting the CPU cache between unpacking the data, and displaying it on the screen, can lead to serious performance degradation.

Texture Streaming

For photographic-quality models which have been properly decimated and compressed, the amount of data devoted to texture is typically 10 times the data devoted to geometry. In order to provide the best user experience, streaming in progressive resolution in texture is a requirement (except in the download-and-view case, such as in PDF files). And unlike progressive mesh encoding, progressive encoding of images generally has no detrimental effect on overall compressed size. For example, the familiar progressive-JPEG approach will typically yield a file somewhat smaller than an ordinary JPEG encoding. And interlaced GIF files are exactly the same size as non-interlaced GIFs.

The same principle holds true in wavelet encoding, which is the dominant texture encoding method used by Live 3D for photographic-quality, textured models. Each “band” of wavelet data progressively increases the resolution, color fidelity, or intensity fidelity of the image. So merely showing this data as it is decoded gives the users a progressively improving quality level, at almost no added cost.

Summary

Many tools, formats, and viewers focus on individual parts of the problem of efficient 3D data transmission, but by only working on one part of the problem, they fail to create useful end-user applications. Large 3D models and scenes require a holistic approach for web optimization, including Decimation, Compression, and Streaming. By addressing all these technology needs, Live 3D and the Meson viewing platform, together provide a comprehensive solution to make high-fidelity 3D feasible in a web environment.

Glossary of Terminology

3D Acceleration – The majority of computer video cards come with some form of hardware based 3D acceleration. Typically, they run on the Open GL or Microsoft's Direct X based software drivers. The inconsistency of these hardware and software combinations has been one of the great challenges for web based 3D product and design visualization. This is why Live 3D does not use 3D acceleration.

Algorithm – a recursive mathematical procedure.

Alpha channel – an eight-bit channel in the 32-bit color image which is used to store transparency data.

Alpha Fade – the ability to fade to a fully transparent surface using the alpha value for either the object or the material.

Ambient Light – light that is present in the environment. It has no focus or direction.

Antialiasing – a mechanism to prevent or remove the jagged appearance of diagonal lines or edges in an image. Antialiasing can be achieved in rendered images by averaging adjacent pixels with sharp variations in color and brightness or by increasing the resolution of the image to meet or exceed the resolution of the device displaying or printing it.

Applet – a small program written in Java and included in a HTML page. It is independent of the operating system on which it runs. See JAR in this Glossary below.

Aspect Ratio – the relative width and height of the frame dimensions of an image.

Backface – polygons are defined as having a front face and a backface. This information is used to determine which way the polygon is facing for purposes of lighting calculations and it can be used to eliminate the need to render one side of the polygon that may not be seen (such as the inside of a box) to improve display speed.

Bitmap – also known as a pixel image. An image composed of pixels. May be any resolution or color depth.

Bookmark – a bookmark is a combination of a script, and a time value, which together describe the state of several sequences, and possibly the camera. Bookmarks are used by the Sequences and Views palette to set all the sequences to their bookmarked values.

CAD – an acronym that stands for Computer-Aided Design.

Color Depth – the number of bits required to define the color of each pixel in an image. Black and white images use one bit. Grayscale images use eight bits (256 shades of gray). Eight-bit color images provide 256 colors. Images with 24-bits provide millions of colors (eight bits for each color: red, green, blue). Images with 32 bits provide an additional eight bits for alpha data.

Database – the area of memory within the program while it is running that is set aside to keep track of objects within a model.

Decimation – the process removing data to simplify and reduce the dataset. In Live 3D, decimation can be done to polygon structures (Generate LOD) and object hierarchy.

Default – a parameter or setting pre-defined in the program which may be changed by the user.

Diffuse Reflection – that component of the light reflecting from a surface caused by its dull or matte nature. Dull or matte surfaces reflect the light striking them in random angles over a large area, giving the surface an equally-bright appearance from a wide range of viewing positions.

Dither – to blend transitions between colors by placing small dots of black, white, or other colors to simulate those colors that can't be represented because of limits on the numbers of colors available.

Extrusion – a method of creating a 3D object using a 2D template; giving depth to the 2D shape.

Fade - the ability to fade to a fully transparent surface using the alpha value for either the object or the material. This is the same definition as Alpha Fade above.

File Compression – the process of reducing the amount of storage space used by a file.

Group – a collection of objects that act as one.

Heuristics – is a technique designed to solve a problem that ignores whether the solution can be proven to be correct, but which usually produces a good solution or solves a simpler problem that contains or intersects with the solution of the more complex problem. Used in Live 3D to make "educated guesses" to assist in scripting, among other processes.

Hex Numbers – a numeral system with a radix, or base, of 16. Usually written using the symbols 0–9 and A–F or a–f. Used in Live 3D and web applications to define colors. Most color pickers, including Photoshop's, provide translation between hex color values and RGB color values.

Hue – the property of color which corresponds to the frequency or wavelength of the light.

Java – a programming language developed by Sun Microsystems, expressly designed for use in the distributed environment of the Internet. It was designed to have the "look and feel" of the C++ language, but it is simpler to use than C++ and enforces an object-oriented programming model.

JAR – JAR is a standards based, platform-independent format that aggregates many files into one. Multiple Java applets and their requisite components (class files and images for example) can be bundled in a JAR file and subsequently downloaded to a Browser in a single HTTP transaction, improving the download speed. The JAR format also supports ZIP style compression, which reduces the file size, further improving the download time.

JPEG – short for Joint Photographic Experts Group, a committee that has been developing a compression standard for still images. This term also refers to the compression method developed by that group.

Lathing – a method of creating a 3D object by revolving a 2D profile about a designated axis.

LOD – LOD is an acronym for Level Of Detail. In 3D work LOD typically stands for the ability to provide multiple levels of detail. Specifically, in Live 3D this term is used to refer the process of making and using reduced polygon versions of the objects.

Luminance – the amount of light radiated by a surface. It refers to intensity or brightness.

Master Model – the native file format for Live 3D. The file extension for Master Models is .XMM. For example, BallInBox.xmm. See XMM in this Glossary below.

Material Fade – similar to Alpha Fade above, the ability to fade to a fully transparent surface using the alpha value of the material.

Mesh Surface – a surface that has common vertex points between adjacent polygons. Mesh surfaces are typically used to define complex forms. The surface also provides smoothing information for the rendering algorithms.

Meson – is the name of a suite of connected technologies which allow interactive applications with both 2D and 3D elements to be developed quickly, and with a very small execution footprint. Like "Java", the name denotes a language, an object model of predefined classes, and a runtime execution environment.

MIP-Mapping – pre-scaled and optimized collections of bitmap images for a texture map, intended to increase rendering speed and reduce artifacts, such as Moiré patterns. They are widely used in 3D computer games, flight simulators and other 3D imaging systems. The letters "MIP" in the name are an acronym of the Latin phrase multum in parvo, meaning "much in a small space".

Moiré Pattern – a Moiré pattern is an interference pattern created, for example, when two grids are overlaid at an angle, or when they have slightly different mesh sizes. In a 3D scene these patterns can also appear when complex texture patterns diminish in size due to perspective or scale. Use MIP mapping to reduce this artifact.

Normals – the mathematical value that indicates the direction a surface is facing in 3D space. Normals may be attached to individual polygons or to the vertex points that define the polygons.

Orthographic – a method of displaying objects in a view where parallel lines do not converge.

Perspective – a depth cue available in Strata Design 3D CX in which parallel lines converge to align with a designated vanishing point. Perspective is a product of several parameters in the displayed view: Lens focal length, camera size, and distance from objects.

Pixel – an acronym that stands for Picture Element. It is the smallest component which makes up the display on a computer monitor. Each dot on the screen is a pixel. Many images displayed on the screen are likewise stored in a pixel form that is mapped to the screen pixels for viewing.

PNG – Like a GIF, PNG files (short for Portable Network Graphics) are compressed in lossless fashion (meaning all image information is restored when

the file is decompressed during viewing). A PNG file is not intended to replace the JPEG format, which is "lossy" but lets the creator make a trade-off between file size and image quality when the image is compressed. Typically, an image in a PNG file can be 10 to 30% more compressed than in a GIF format. PNG is the only format supported in Live 3D that incorporates a separate channel for alpha transparency information.

Polygon – a closed plane bounded by three or more line segments.

Public and Private – Public objects in Live 3D provide access to object-level alpha fading. When fading a public object all of that object's children are also faded. Private objects may only be individually faded using the material level alpha and/or by using an alpha channel imported with a texture map. Only PNG files are supported for alpha channel import.

Reflectivity – the percentage of the total amount of light striking the surface that reflects from, or bounces off, the surface of the object.

Refraction – the change in direction of light as it passes from one transparent material to another. This causes an apparent shift in the image showing through the transparent material.

Rendering – a visual representation of the model. This is accomplished by combining a geometric model with descriptions of its surface properties, lighting, etc. to generate an image of the model.

Resolution – the number of pixels per unit. The higher the number of pixels, the higher the resolution, and the greater the capability to display details.

RGB – a method of representing all colors as the combination of red, green, and blue light.

Saturation – the extent to which a color is made purely or a particular hue; the vividness of the hue.

Shading – the process of calculating how the light sources in your model will affect the color, value and highlights on the object surface.

Shaders – the algorithm used to calculate shading. In Live 3D you have the option of shading using Phong shading or using no shading at all (used for pre-lit texture maps).

Smoothing Groups – groups of polygons from which the surface normal smoothing calculation is made. These calculations determine which surfaces

the renderer attempts to display as continuous, smooth surfaces – despite the fact that the surfaces are constructed from a series of flat polygon objects.

Specular Reflection – that component of the light reflecting from a surface caused by its shiny or glossy nature. Shiny surfaces reflect light striking them in clearly defined angles of incidence; resulting in "hot spots" corresponding to the direction of the light sources providing the illumination. Can be thought of as actual reflections of the light sources themselves.

Surface Mapping – a process in which an image is used to define an object's surface properties. A separate map can be used to define and transparency.

Texture Maps – images which are wrapped around the surface of an object. Texture maps in Live 3D can be used to define color and/or transparency on a pixel by pixel basis.

Tessellate – a technique used to manage datasets of polygons by dividing them into polygon structures for rendering.

TIFF – short for Tagged-Image File Format. This format was developed by Aldus® and Microsoft® to represent pixel-based images, such as those produced by scanners.

UV Mapping – the surface of a 3D object can be defined as a two-dimensional, "unwrapped" surface. This 2D map of the surface is then used to "map" or associate an image with the 3D surface. This is can also be thought of as "wrapping" the image around the object. "U" represents the horizontal dimension of the unwrapped surface and "V" represents the vertical dimension. Both dimensions are measured from 0 to 1.

Vertex – a point of intersection of two vectors or a point used to define a polygon.

Vertices – the plural term for vertex. Defines two or more vertex points.

Wavelet – is a form of data compression well suited for image compression. The goal is to store image data in as little space as possible in a file. A certain loss of quality is accepted, known as lossy compression. Using a wavelet transform, the wavelet compression methods are better at representing transients, such high-frequency components in two-dimensional images, for example an image of stars on a night sky. This means that the transient elements of a data signal can be represented by a smaller amount of information than would be the case if some other transform, such as the more widespread discrete cosine transform, had been used.

Waypoint – a collection of state information for objects and materials associated with a point within a sequence.

Welding – a process of combining two or more vertices into one. Welding produces a more efficient data set by requiring only one set of position information for the combined verticies.

Wireframe – a fundamental rendering method that represents 3D objects with connecting lines outlining the polygon edges.

X-Axis – the horizontal axis which represents width.

Y-Axis – the vertical axis which represents height.

Z-Axis – the "in/out" axis which represents depth.

XML – (Extensible Markup Language) is a W3C (World Wide Web Consortium) initiative that allows information and services to be encoded with meaningful structure and semantics that computers and humans can understand. Live 3D uses this format to maintain an editable version of the Master Model (saved within the XMM file).

XMM – the file extension used by Live 3D for a natively saved Master Model file. At the outermost level, the Master Model format is identical to ZIP/JAR archive format, except that it uses the .XMM file extension. The key file in the XMM archive is a file called MASTER.XML. With the exception of textures, which must be included in the XMM using a standard format (JPEG, PNG, GIF), the entire content of a model can be written into the XML format file.

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