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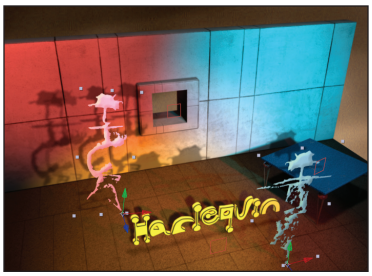
Integrating with 3D Applications

Techniques to get more information from your 3D program into After Effects.

Real 3D programs have several advantages over After Effects: For example, their objects have real depth, and the texturing and lighting options are far more advanced. However, this power often comes with a significant speed penalty, which can be a problem when accommodating client changes. After Effects is also the better tool in which to refine the final look of your 3D worlds. Offloading portions of the work from your 3D program to After Effects will save time while giving you more power and flexibility – but it requires some planning to set up.



Tight integration makes it easier to add video and other layers to 3D environments in After Effects. Video courtesy Creative License; textures courtesy Artbeats.

In this chapter, we will give advice on how to successfully integrate your 3D program with After Effects. We will then work through a pair of case studies: Adding 2D video to the face of a 3D object, and integrating lights and shadows between After Effects and your 3D render. The DVD also contains a bonus chapter which covers the 3D Effects that can access additional information saved with some 3D renders such as the Z buffer (how far objects are away from the camera).

Unfortunately, there is no one universal file format to bring information from a 3D application into After Effects. In our case studies, we are going to focus on using Maxon Cinema 4D as it currently has the tightest integration with After Effects, plus is the 3D program we personally use. However, many of the concepts we'll be covering are universal and can be applied to other programs as well. We will also include some specific advice for programs such as Autodesk Maya and 3ds Max.

FACTOID

3D Channel Effects

Bonus Chapter 40B on this book's DVD covers the special 3D Channel effects such as Depth of Field and Fog 3D, as well as how to replicate their results with 3D programs not directly supported by these plug-ins.

Example Project

Explore the 40-Example Project.aep file as you read this chapter; references to [Ex.##] refer to specific compositions within the project file.

TIP

Motion Blur

If you rendered your 3D scene with motion blur enabled, you should also enable motion blur for the 3D layers you add in After Effects. Don't forget to match the blur's shutter angle you used in your 3D program.

GOTCHA

Maya Camera Import Bug

There is a known issue where some older Maya .ma projects may import at the wrong size. For example, **Maya_camera.ma** included on this book's disc imports as 540x486 pixels, when it should be 320x240.

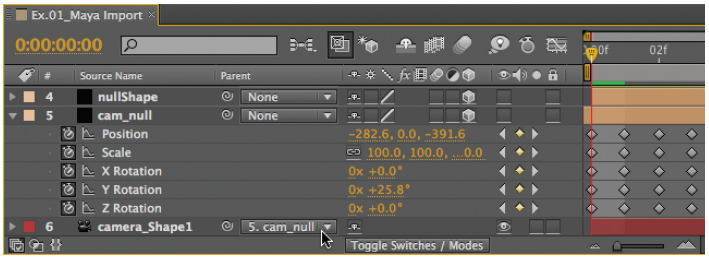
3D Advice

The next few sections include topics to keep in mind as you work on a project that will flow from a 3D program to After Effects. This includes getting the camera move across, lining up world coordinates between the two programs, and creating mattes so that select objects in the 3D world will appear to pass in front of layers added in After Effects.

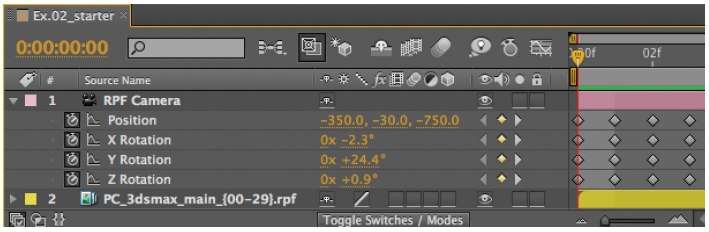
The Camera Move

A typical workflow will include finalizing your camera move in the 3D program, rendering the 3D scene, then bringing the camera move and render into After Effects. Your render will be a 2D layer in After Effects, as it already has the camera move calculated into it; you can optionally enhance the render using After Effects' tools. You can then add new 3D layers on top of this render in After Effects, using the camera data you moved across. For example, you can add text, video, and other objects to your scene in After Effects without having to go back into your 3D program for another potentially lengthy rerender.

It is a really, really good idea to finalize the camera move before bringing it into After Effects. Changing the camera move means having to re-render the 3D scene as well as replace the camera move in After Effects. Do a few rough renders and get the client to sign off on the general idea and movement before putting in too much work.



Maya ASCII (.ma) project files may be imported directly into After Effects. The result is a comp with the Maya camera, any null object with "null" in its name, parenting chains including cameras and nulls, and their animation.



Programs such as 3ds Max can embed their camera move in an RPF file sequence during their render. After Effects can extract this data to create a matching camera of its own.

The way you move camera data from a 3D application into After Effects varies from program to program. Here are some of the more common options:

- Export your project to the .ma – Maya ASCII – format. After Effects can then import this project through its normal File > Import menu command; it will extract the camera movement from this file along with the movement of any null objects that explicitly have the word "NULL" or "null" in their name. An example of the result is demonstrated in this chapter's example project in the comp [**Ex.01-Maya Import**]. If your project uses non-square pixels, a square pixel precomp will also be created which contains the actual camera animation.
- Embed the camera move in a .rla or .rpf frame sequence when you render. Bring this sequence into an After Effects comp, select it, and use Animation > Keyframe Assistant > RPF Camera Import.

After Effects will then create its own camera with the same movement. You can practice this with the comp [**Ex.02_starter**]; the result – along with some additional compositing tricks using 3D Effects – is demonstrated in [**Ex.02-final**].

- Cinema 4D has the ability to save an .aec project file which contains the camera move and much, much more (which we will discuss in detail in the upcoming case studies). After Effects can then import the .aec file with a Maxon-supplied plug-in.
- If the functionality you need isn't built into your 3d program of choice, you may be able to write a spreadsheet or script that converts keyframe data from your 3D program into After Effects keyframe data, and paste that into a new camera created in After Effects; see the *Camera Data Translation* sidebar for leads on others who have already.
- Worst case, create an object in your 3D world in the same location as layers you would like to add in After Effects, with obvious markers in its corners. Make a separate render pass of this object, and use Motion Tracking in After Effects to corner pin your new layer into the position and perspective you had in mind. This was demonstrated in Chapter 30's [**Ex.05**]; another example is included in this chapter's [**Ex.03**].

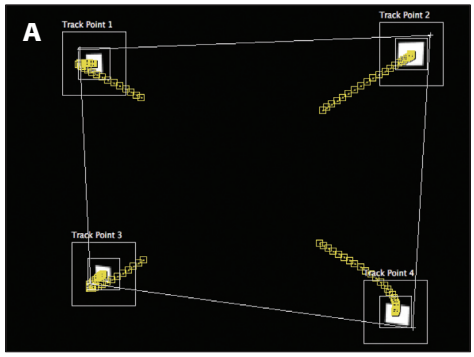
Sometimes, your imported camera move will not appear to match the motion in your 3D render. The most common problem is that the Angle of View for the After Effects camera is wrong. Verify the value for this parameter (also known as Field of View) in your 3D program, and enter this value manually in the Camera Settings dialog in After Effects.

Some 3D programs also do not take into account any curves you may have applied to the camera's path or speed. Therefore, you will often need to "bake" the camera move in the 3D program to create a keyframe for every frame of your timeline before exporting its move. For example, in Maya use Edit > Keys > Bake Simulation in Maya.

Camera Data Translation

Several users and third parties have created plug-ins and scripts to help move camera data and related information between After Effects and select 3D programs that may not have broad After Effects support built in:

- MAX2AE from Boomer Labs (*www.boomerlabs.com*) allows you to import a scene from After Effects into 3ds Max 6 or later. It also provides a nice alternative to importing Max scenes into After Effects, including support for lights and "helper planes."
- 3DMation's MoCon (*www.3dmation.com*) is a collection of scripts to transfer 3D motion to and from After Effects, Maya, Nuke, SynthEyes and Electric Image, including going from After Effects into Modo.
- Several useful scripts reside on the essential AE Enhancers site (*www.aenhancers.com*), including getting an After Effects camera move back into Cinema 4D or 3ds Max, plus exporting a simple representation of your scene from After Effects to Maya, Max, and LightWave.
- Byron Nash has created a Softimage|XSI script that exports cameras, lights, nulls, and polygons from XSI to After Effects. It's available at: *armoredsquirrel.com/blog/?page_id=69*



If there is no way to import the camera data from your 3D program into After Effects, you can create a 3D model with dots to track in After Effects (A), and corner pin a new layer in After Effects to their location (B). 3D renders courtesy Reject Barn.

TIP

The 50 Percent Solution

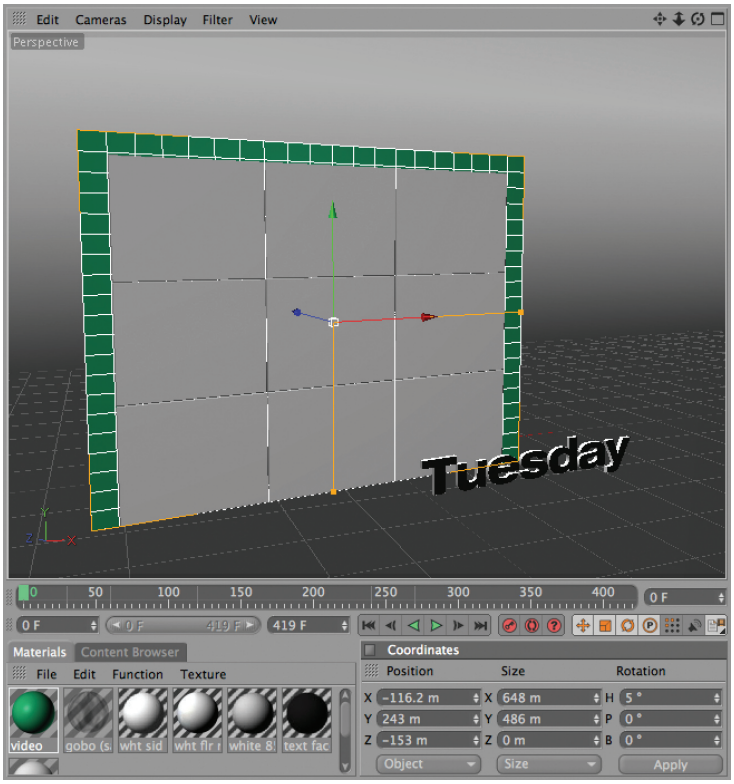
If we know we will be compositing a layer in After Effects onto the surface of a 3D model, we usually try to make that surface average 50% luminance (gray) after it has been textured and lit. If we composite the new layer in After Effects using modes such as Overlay or Hard Light, it will pick up the lighting and shadows that fall across the 3D surface without unduly changing the appearance of the new layer.

When Worlds Align

When you try to place a new object in After Effects into your already-rendered 3D world, the next question becomes: How big should everything be? It can be quite disconcerting to, say, add a video capture to a scene only to find it is several times bigger than everything in the 3D render – or at the other extreme, is just a few-pixel speck to the 3D camera.

In an ideal world, you should first decide on the sizes of the objects you will be adding in After Effects – such as 1080-line tall HD video, or a 72-pixel tall text caption – and construct your 3D world so that its models have a good size relationship to these layers.

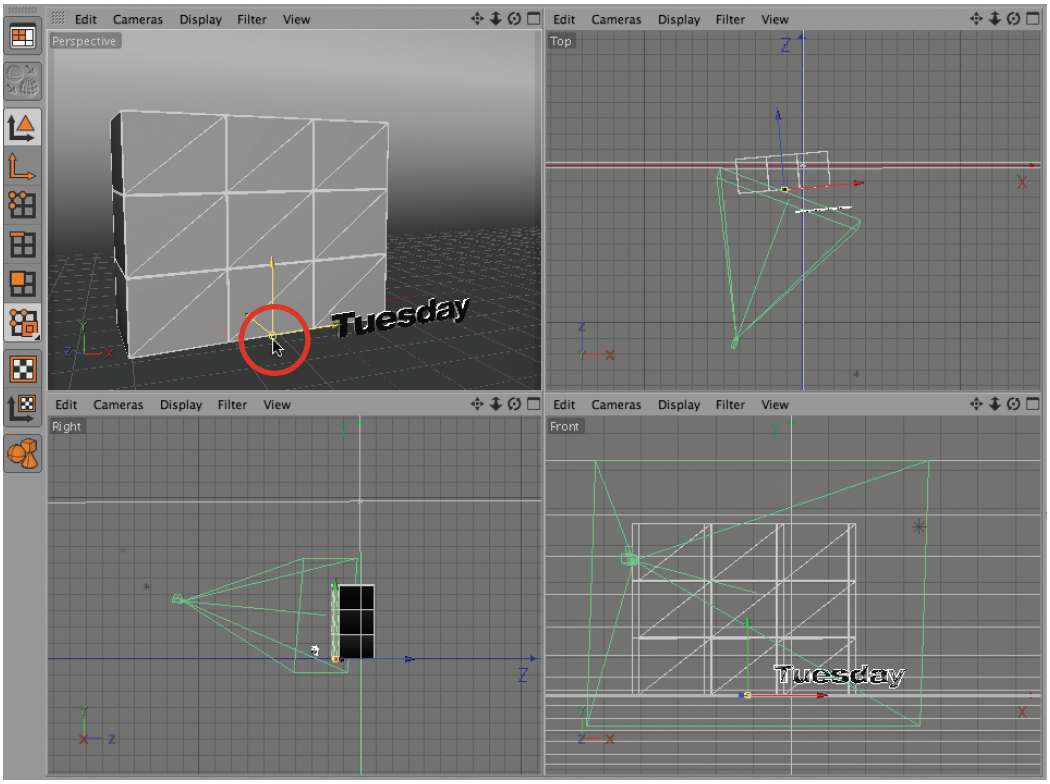
For example, if we know we will be compositing standard definition video onto 3D videowalls we're about to construct, the first thing we'll do in our 3D program is create a plane that is the same number of "world units" as our video is in pixels, and then build the rest of our world based on that reference. If you were not fortunate enough to plan this out ahead of time, or run into common issues such as the world units are in meters but the camera position translation is in centimeters, just increase or decrease the Scale value of the new layers in After Effects to resolve the difference.



When building a video screen in a 3D program, we start by creating a dummy plane (the green rectangle) that corresponds to a square pixel size for the video we later plan to place on it. We then make our video screen (the gray boxes) slightly smaller so we can later crop off the Action Safe area of the video.

In addition to the size of objects, you also need to know where they are located! If you're lucky, your 3D program of choice translates the position of objects other than just the camera. For example, importing a Maya .ma file will also bring across any null objects with NULL in their name. Place a null object where the face of your videowall or line of text should be, and you can use the resulting coordinates to copy and paste to your new object in After Effects. In Cinema 4D, you can add an External Compositing tag to an object, which will cause a null object or solid to be created at the same place in After Effects. Dummy lights or cameras are also sometimes used in other programs for this purpose.

Worst case, you can write down those coordinates and manually type them in. Just be aware of where the anchor point of your 3D object is: Quite often, it may be in the middle of the model, rather than on its

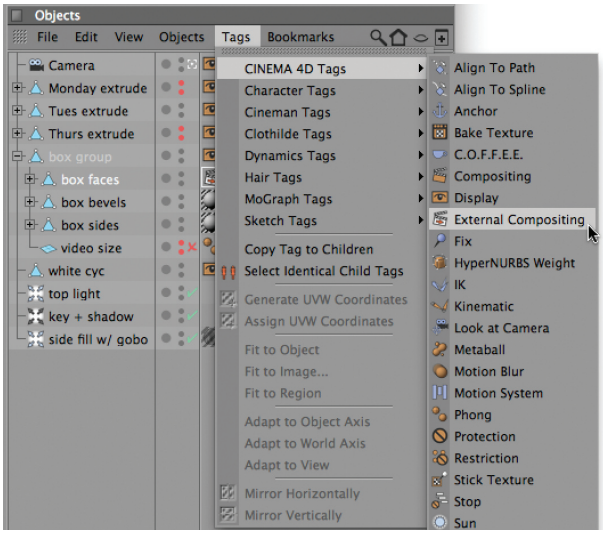


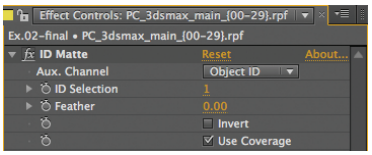
face. Make sure the anchor is in the same relative position between the two programs, such as the bottom of the 3D object and the After Effects layer.

On occasion, you may find that some of the axis units are reversed between your 3D program and After Effects. For example, After Effects considers a positive Z Rotation to be clockwise; some programs think a positive Z Rotation means counter-clockwise. It is easy to change the sign of a value for an object's location; it is a little trickier when this translation is already factored into, say, the camera's keyframes. Fortunately, you can use fairly simple expressions to perform the reverse translation. In our hypothetical example, you would merely assign the expression **–value** to Z Rotation; the resulting expression for Position would be **[value[0], value[1], –value[2]]**.; modify as needed for other dimensions.

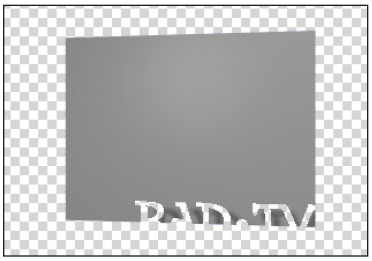
And remember, you might also need to throw in an additional multiplier for world unit translation issues, such as ***10** or **/10** for the difference between meters and centimeters.

Place your object's anchor point at the location where you plan to place the corresponding layer in After Effects – such as on the face (not in the middle) of a videowall (above). Then either write down its coordinates, or find a way to export its position such as using an External Compositing tag in Cinema 4D (below).





In programs that support the RLA or RPF format, assign a Material or Object ID to the surface you want to use as a matte. Then use the ID Matte effect (above) to isolate it in After Effects, allowing it to be used as an alpha matte (below). 3D render courtesy Fogline.

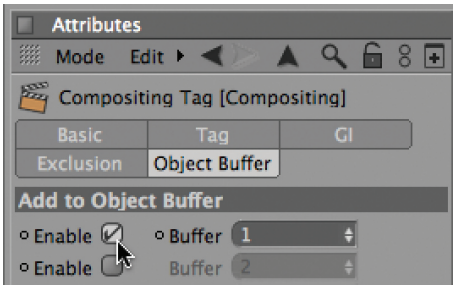


Mattes

Your 3D renders will be used as 2D layers in After Effects. You then need to place any 3D layers you add in After Effects on top of these renders. But what if you want the illusion that an object in your 3D render is passing in front rather than behind one of your new layers? Or on a simpler level, what if you want to isolate one object in your original 3D world for color correction or other treatment inside After Effects?

The solution to both of these is to render a separate movie based on the object you wish to isolate, and to use it as a track matte to cut out a portion of either your new layer or a copy of your original 3D render. Exactly how to go about this again varies from program to program. Here are some typical approaches:

- In 3ds Max, assign an Object ID to the model piece you wish to isolate (done in the Object Properties dialog by changing the G-Buffer Object Channel). If you have more than one model piece that should be part of the same matte – such as the faces of a series of letters – it may be easier to texture them with the same material, then use a Material Effect ID (done in the Materials Editor). When you render, save this data in an RPF Sequence as an Optional Channel. In After Effects, make a duplicate of your render, apply Effect > 3D Channel > ID Matte, and select your channel type and ID. The alpha channel of the result can then be used as a matte. This is covered in more detail in Bonus Chapter 40B on the DVD and demonstrated in layer 1 in this chapter's comp [**Ex.02-final**].



In Cinema 4D, you can apply a Compositing tag to a layer, and designate it to create a high-contrast matte in an "object buffer."

- In Cinema 4D, select the object you need to create a matte for in the Object Manager and add a Compositing tag to it (Tags > Cinema 4D Tags > Compositing in Release 11's Objects panel). Then in the Add to Object Buffer section, enable one of the Buffers and assign it a number. Finally, include this channel in a Multi-Pass render. The result is a render that can be used as a luminance matte. We will demonstrate this procedure in more detail in the case studies later in this chapter.
- If your 3D program does not have an explicit way to create a channel or render pass based on the object you wish to isolate, you will need to manually set up a special render that isolates it. The most common approach is to assign a 100% self-luminant white texture or material to the object in question, then assign pure black materials to all the other objects (make sure that this material does not react to any lights – set reflections, specular highlights, and diffuse values all to 0%). Render, and the result will be a luma matte for that object. There are also approaches that create alpha mattes: In Maya, you can apply Use Background to objects that are supposed to be transparent; in other programs such as Softimage|XSI you can alter the alpha value of an object (used in [**Ex.03-final**]).

We will demonstrate how to use these mattes in the case studies as well as in Bonus Chapter 40B.

GOTCHA

Reflections and Mattes

If you can see the reflection or refraction of one object in another, there is a chance this artifact will be included in a matte or object buffer created by the 3D program.

TIP

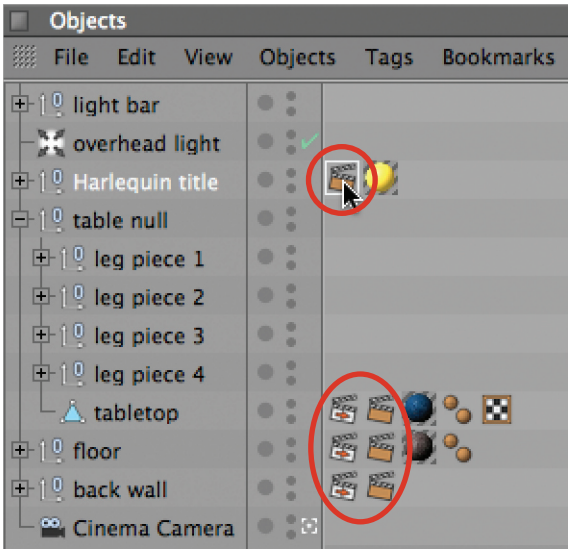
Follow Along

For those with Cinema 4D, our original Cinema project file for Study #2 is on this book's disc in **40_Chapter Sources > Cinema 4D Projects > C4D Room**.

Study #2: Shadow Trickery

One of the more challenging areas of integrating a 3D render with After Effects objects is handling the shadows. You'd like for any new objects you add in After Effects to cast 3D shadows onto objects in the original 3D render. However, the 3D render must be imported as a 2D layer, and 3D layers cannot cast 3D shadows onto 2D layers. Your choices? Do without, fake it with an ordinary 2D Drop Shadow effect, or do a little extra work: Add 3D layers in After Effects to mimic objects in the original 3D scene which can then catch the 3D shadows. Let's try this last approach.

Open [**Ex.06_starter**]; it contains a more complex room with a window in the back wall to worry about as well as a table. Here are the steps needed to make it shadow-friendly in After Effects:



Steps 1–2: We added Compositing and External Compositing tags to the **tabletop**, **floor**, and **back wall** models to generate null objects and mattes for them in After Effects. We also added a Compositing tag to generate a matte for the **Harlequin title** model.

Step 1: The wall, floor, and table are candidates to catch shadows, so we need to know where to place their stand-ins in After Effects. We made a note of their sizes and where their faces were located in 3D space. In Cinema, we set their anchors to the center of their faces, then applied External Compositing tags (discussed in the previous section) to these models. This resulted in null objects being created for them in the corresponding .aec file.

Step 2: To crop our stand-in layers, we needed to render mattes that corresponded to just the visible portions of the faces of these models. In Cinema, we applied Compositing tags to these objects and assigned them to individual Object Buffers. We did the same for the Harlequin title so we could place layers in After Effects "between" the title and the wall.

Step 3: Once these 3D passes were rendered, we imported them along with the camera and light data into After Effects. We've already done this for you in [**Ex.06_starter**].

Open the composition that was created and note the three null objects **back wall**, **floor**, and **tabletop**. You need to replace these with solids. Here are the steps for one; the others are done the same way:

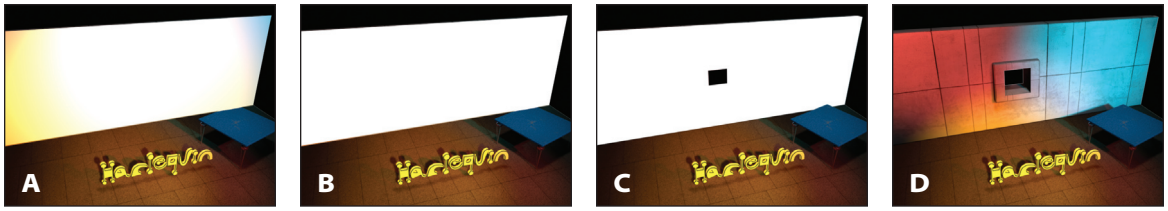
Step 4: The face of the **back wall** model piece is roughly 3110 wide × 1050 high in "world units" in Cinema, so create a Layer > New > Solid of this size, using square pixels and colored white. Name it "**wall shadow**" and click OK.

Step 5: Next, you need to move this shadow catcher into the same position as the wall. To do this, enable the 3D Layer switch for **wall shadow**. Select **back wall** (the null object created by Cinema) and type P followed by Shift+R to reveal its Position and Rotation parameters. Copy these, and paste them to **wall shadow**.

TIP

More on Multipass

Check out dvGarage's Multi-Pass Render Lab for a set of in-depth training materials on enhancing renders using a multipass approach (visit *dvgarage.com* and look under Products > 3D Development).



Steps 4–8: Create a white solid the size of the back wall, put it in the same position (A), set its Material Options > Accepts Lights to Off (B), crop it by its corresponding matte (C), and set its Mode to Multiply (D) so it blends into the original 3D render.

Step 6: We want this layer to receive our new shadows, but not otherwise be affected by lights in this scene. With **wall shadow** still selected, type AA to reveal its Material Options in the Timeline. Leave Casts Shadows = Off and Accepts Shadows = On (their defaults), but set Accepts Lights to Off.

Step 7: The shadow catcher needs to be matted to match the visible portions of the 3D wall. In the **Special Passes** folder, locate **AEA Room_object _2.mov** and drag it into your comp just above wall shadow. Reveal the Modes column (F4) and set the TrkMat popup for **wall shadow** to Luma Matte.

Step 8: To composite just the dark shadows – not the wall's white color – onto the back wall, set the Mode popup for **wall shadow** to Multiply.

After you're done, new 3D layers added in After Effects can cast shadows on the wall, floor, and table. If you have Cinema and are up for a challenge, use our projects to also create a shadow catcher for the Harlequin title…

Step 9: Add a layer to the scene in After Effects, enable its 3D switch, and enable Cast Shadows. Its shadow will appear on the back wall of the original 3D render. Feel free to tweak the color, intensity, and shadow darkness of the lights originally created in Cinema to work best for your new layers in After Effects, but keep their positions if you want the new shadows to match the original render.

If you want to cast shadows on the floor or table, repeat steps 4–9 above and use these parameters:

- The floor is about 3100×2050 pixels in size and uses Object Buffer 3. You will need to set its X Orientation to 270° to flip it down horizontally.
- The tabletop is approximately 512×512 pixels and uses Object Buffer 4. Due to differences in how the object was created in Cinema, disable keyframing for the three Rotation values, zero out Y Rotation and instead set Z Rotation to –17°, and set X Orientation to 270° to flip it down.

The comp [**Ex.06-Shadow Trickery-composite**] has these three shadow catcher layers set up, with some new objects casting shadows. Adding 3D elements from After Effects into a fully rendered 3D world creates an interesting hybrid look in its own right; you can also gain substantial flexibility from distributing your workflow between the programs.

CONNECT

Blending modes: Chapter 9.

Track mattes: Chapter 11.

Working in 3D: Chapters 13–16.

Null objects and parenting: Chapter 17.

Time stretching: Chapter 28.

Corner pin motion tracking: Chapter 30.

Expressions: Chapter 37.

Importing files and the Interpret Footage dialog: Chapter 38.

Pixel aspect ratios and frame rates: Chapter 41.