16

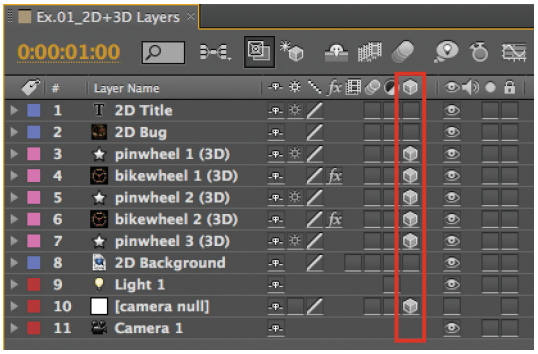
Published by Focal Press, ISBN: 978-0-240-81415-5

Parallel Worlds

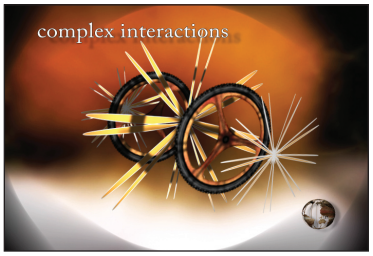
Combining 3D layers from different sources.

There are several ways to create 3D content for After Effects, including native 3D layers, 3D renders, and 3D effects. Unfortunately, not all of these are compatible with each other, resulting in problems – such as one "3D" layer not casting shadows onto or intersecting with another "3D" layer. Add that to the usual issues with combining 2D and 3D layers in the same composition, and it's no wonder some users are left confounded and confused.

In this chapter, we'll explain the issues with creating and using different 3D content, as well as how to overcome some of the resulting problems. Then we'll move onto creating 3D content with Adobe Photoshop Extended (including Vanishing Point Exchange, 3D model import, and the new Adobe Repoussé extrusion engine) as well as the newly bundled Digieffects FreeForm 3D warping and displacement effect. We'll end with a brief summary of useful third-party 3D plug-ins.



2D and 3D layers may peacefully coexist in the same comp. A benefit of this is that 2D layers – such as the title, bug, and background – stay in the same place as the 3D camera moves around the 3D layers.



Example Project

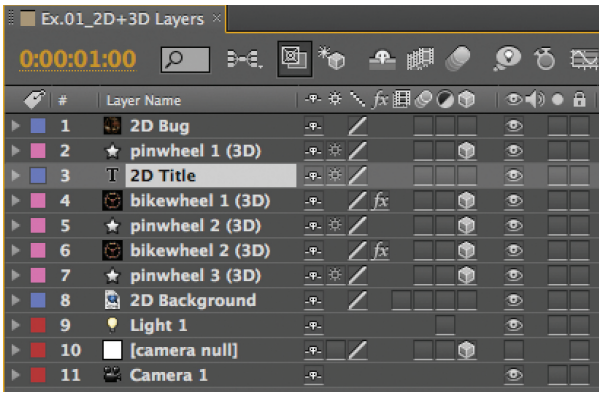
Explore the 16-Example Project.aep file as you read this chapter; references to [Ex.##] refer to specific compositions within the project file.

As some 3D effects are slow to preview, we suggest enabling Preferences > Memory & Multiprocessing > Render Multiple Frames Simultaneously.

2D versus 3D Layers

Interactions between 2D and 3D layers were discussed at the end of Chapter 13, but the subject is worth recapping here, as it provides the foundation for almost everything else we'll be discussing in this chapter.

Layers in After Effects normally exist in 2D space and are composited together to create a final 2D image. Enabling a layer's 3D Layer switch has two consequences: It allows the layer to be moved in three dimensions, but it also routes that layer off to a separate internal rendering engine. The output of that separate rendering engine is a *2D* layer, which is then composited with the other 2D layers inside a composition. This is how 2D and 3D layers can coexist inside the same comp: 3D layers must eventually be converted to 2D layers.



Placing a 2D layer between 3D layers in the Timeline panel (above) acts as a "rendering break" which disrupts how shadows fall between them (below). Note the lack of shadows on the front bikewheel.

When multiple 3D layers are adjacent to each other in the Timeline panel's layer stack, they may interact by way of intersecting each other, casting shadows onto each other, and receiving shadows from each other. However, if a 2D layer appears between a selection of 3D layers, the 2D layer acts as a "rendering break" that separates adjacent 3D layers into their own groups. Although all 3D layers in a comp react to the same 3D lights and cameras in a comp, a particular 3D layer may interact only with adjacent 3D layers inside its group. Try this with [**Ex.01_2D+3D Layers**] in this chapter's example project: Drag one of the 2D layers (**2D Title** or **2D Bug**) between the 3D layers (the **pinwheel** and **bikewheel** layers) and observe how the shadow patterns change.

Why is this happening? 3D layers cannot cast "3D" shadows (those created by 3D lights) onto 2D layers – again, you will notice in [**Ex.01**] that the full-frame background video does not receive shadows from any of the 3D layers. A consequence of this is that if a group of 3D layers is collapsed internally into a 2D layer during compositing, a 3D layer in another group cannot cast 3D shadows onto this collapsed group, and vice versa. That's why some of the shadow patterns between 3D objects in [**Ex.01**] appear to toggle off and on as you drag 2D layers between them.

However, you can still use normal 2D compositing tricks. For example, a 2D shadow created using Effects or Layer Styles will "fall" from a 2D layer onto the 3D layer group underneath as well as other 2D layers (we used this trick in [**Ex.01**] for the title and bug); a blending mode set for a 3D layer will interact with both 2D and 3D layers underneath (try it with one of the 3D layers in [**Ex.01**]).

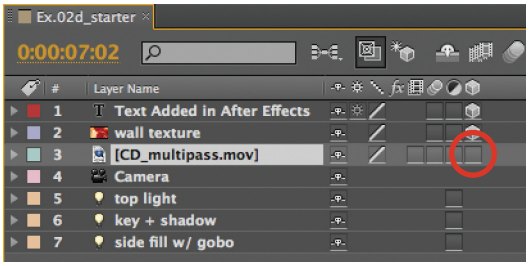
Different Types of 3D Layers

Now that we have a handle on how 2D and 3D layers interact (or don't, in some cases), next comes understanding what is really a 3D layer, and what is really a 2D layer. There are a surprising number of ways to create 3D imagery that require 2D layers in After Effects. First we'll survey the different ways of creating 3D imagery, then demonstrate how to overcome some of the resulting limitations.

After Effects 3D Layers: If a layer has its 3D Layer switch enabled, it's a true 3D layer as far as After Effects is concerned. This includes any footage item you drag into a composition, as well as text layers, shape layers, and solids that you create inside a composition – as long as you enable their 3D Layer switches. The same applies to nested compositions: Interesting and useful things happen if you have a nested composition containing 3D layers, then enable both the 3D Layer and Collapse Transformations switches for that nested comp. All of the 3D geometry comes forward into the current comp, but you have only one layer to manage. This is discussed in more detail in Chapter 20, and is demonstrated in comp [**Ex.02a**].

A benefit of Per-Character 3D text is that shadows may be cast between characters in the same text layer as well as onto adjacent 3D layers. Be warned that applying an effect to the text layer will disable its shadows. Background courtesy Digital Vision/Prototype.

Per-Character 3D Text: Normally, text layers are rendered as 2D layers. If you enable the 3D Layer switch for a text layer, all of the text is manipulated in 3D as one flat plane. However, if you select the Animate > Enable Per-character 3D option for a Text layer, each individual character will be treated as a separate 3D layer, including the ability for characters in the same text layer to cast shadows onto each other. This is discussed in more detail in Chapter 21 and demonstrated here in comps [**Ex.02b**] and [**Ex.02c**]. The catch: If you apply any effect or layer style to a Per-Character 3D Text layer, it breaks the 3D interactions. Try applying Effect > Perspective > Bevel Alpha to the text layer in either [**Ex.02b**] or [**Ex.02c**] and note that the shadow interaction is lost.

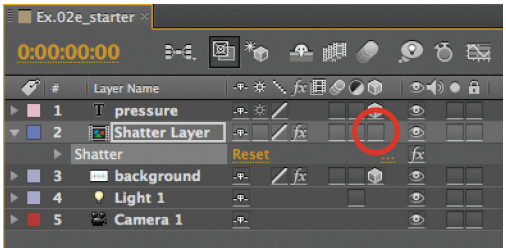


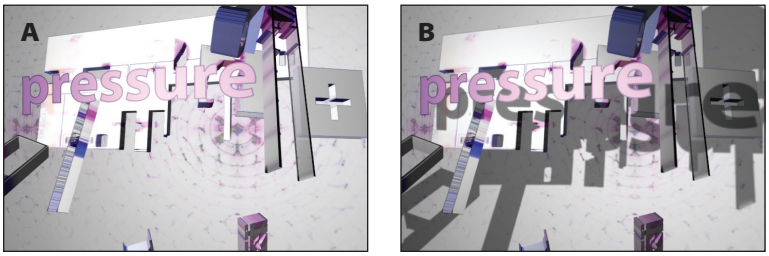
A project created in Maxon CINEMA 4D may be able to pass its camera and lights onto After Effects, but the 3D render will be a 2D layer (above). This means it will not accept shadows created by 3D layers added in After Effects (right). Fortunately, you're about to learn a trick to make those shadows work again. Wall texture courtesy Digital Vision/Naked & Scared.

Renders from a 3D Program: When you create a scene in a dedicated 3D program, it has its own camera and lights that are taken into account when the scene is rendered. Explore the various layers in comp [**Ex.02d_starter**]: The 3D-rendered room (layer 3) was imported into After Effects along with its camera and lights. As 3D perspective is already factored into the render, this layer must be treated as a *2D* layer – you don't want the layer reacting to both the 3D program's camera as well as the After Effects camera. This creates issues when you want to insert additional 3D elements in After Effects: The **wall texture** 3D

layer added in After Effects catches shadows from the After Effects 3D text layer (notice they are adjacent layers so they are rendered as a group). However, the 3D-rendered room does not receive these shadows because it's a 2D layer. Chapter 40 on 3D Integration is dedicated to dealing with these issues; later in this chapter we will show how to cast shadows from 3D layers in After Effects onto other 2D layers (as employed in comp [**Ex.02d-final**]).

Layers with 3D Effects Applied: Many effects – from such classics as Shatter and CC Cylinder, to the newly bundled Digieffects FreeForm, to popular third-party effects such as Zaxwerks Invigorator, Trapcode Particular, and Boris BCC Extruded Text – create 3D imagery with depth and perspective. Most "3D" effects also have options to react to 3D camera and lights in After Effects. However, in reality these effects are miniature 3D programs residing inside After Effects: Rather than using the After Effects rendering engine, they have their own internal rendering engines that create their own imagery.



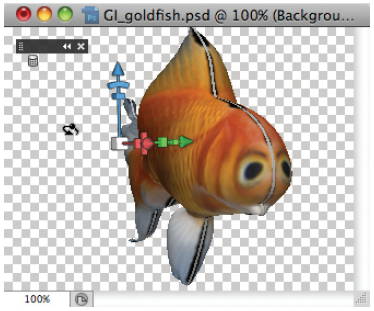


3D effects such as Shatter are normally applied to 2D layers (above). As a result, they do not cast nor receive 3D shadows (A); they also serve as render breaks to stop other 3D layers from rendering as a group. However, we'll show you a trick to regain some 3D interaction (B). Footage courtesy Getty Images/Discovery.

The result is a 2D layer – just like one produced by a dedicated 3D program – that does *not* interact with 3D layers in After Effects, as demonstrated in [**Ex.02e_starter**]. However, there is a trick you can employ that allows you to enable that 3D Layer switch and regain some interaction. This is shown in comp [**Ex.02e-final**] and will be demonstrated later in this chapter.

3D Imagery Imported from Photoshop Extended: Photoshop has been gaining 3D capabilities over time. Currently, it can create two types of 3D imagery which may then be imported into After Effects: Vanishing Point Exchange and Live Photoshop 3D. Vanishing Point Exchange files contain an arrangement of flat images with their 3D Layer switches enabled in After Effects. Live Photoshop 3D (also used by Adobe Repoussé) is like any other 3D effect mentioned above: The effect is doing the rendering, and the result is a 2D layer. Later in this chapter, we will work through exercises demonstrating these two ways of creating 3D imagery in Photoshop Extended, including how to bring the result into After Effects.

To summarize: A surprising amount of 3D imagery, including that created by 3D effects, actually involve 2D layers. 3D layers do not cast 3D shadows onto 2D layers; 2D layers do not cast 3D shadows onto 3D layers. But it is possible to work around some of these limitations.

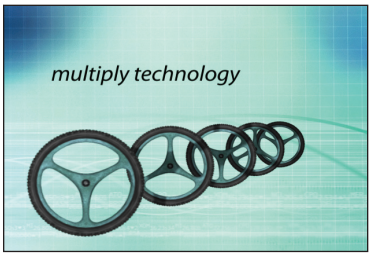


Any still image with an outline or alpha channel can be inflated by Repoussé into a 3D model, as in **[Ex.02f]**. (In Photoshop CS5, open any file in SOURCES > Objects, choose Select > Load Selection, then click OK. Now apply 3D > Repoussé > Current Selection and have fun!) Fish courtesy Getty Images.

3D Shadows onto 2D Layers

There are many occasions where you may want 3D layers to cast 3D shadows onto 2D layers. For example, you may want 3D layers added in After Effects to cast shadows on a render from a dedicated 3D program. Or you may have a full-frame 2D background layer that you want your 3D layers to cast shadows onto.

There is more than one solution to this puzzle. After years of trying different approaches, we've settled on what we call the "shadow catcher" technique. With this approach, you place a white solid with its 3D Layer switch enabled at the location in 3D space where the 2D layers should be – this is what gives the shadows the correct size and perspective. You then adjust the Material Options for this layer so that it receives shadows but no other lighting effects, yielding pure shadows on a white background. Finally, you set the Blending Mode for this layer to Multiply so the shadows on this layer are blended onto the 2D layer(s) underneath. Let's walk through an example:

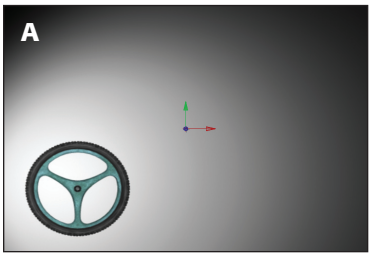


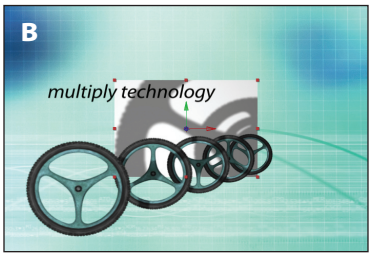
Step 1: The initial composition lacks something. The wheels are casting shadows onto each other, but the foreground elements aren't interacting with the background elements. Grid pattern courtesy Artbeats/Digital Biz.

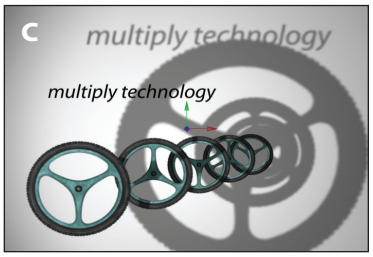
Step 1: Open [**Ex.03_starter**] and RAM Preview: The composition contains a set of 3D layers (the bike wheels and text) with an animated 3D camera move. The 3D layers are set to cast and receive shadows; you will see shadows falling from the forward wheels onto those behind. We've also created a background out of two pieces of full-frame 2D stock footage. We suspect this design might look better if all the elements appeared as if they were in the same room.

Step 2: Add a Layer > New > Solid. Change its name to "**Shadow Catcher**" and set its Color to white. Click OK.

Step 3: Drag **Shadow Catcher** down the layer stack to be just above the first 2D background layer (**AB_DigitalBiz.mov**) and enable its 3D Layer switch (if the Switches column is not visible, press F4 to toggle it forward). It will react to the 3D light in the scene and pop in front of most of the 3D elements.







Steps 3–4: Enable the 3D Layer switch for the Shadow Catcher layer; it will react to the light (A). Increase its Z Position to place it behind the text and wheels (B). Increase its Scale as necessary to fill the frame (C).

Step 4: Move to the end of the comp to view the elements in their "at rest" position. Press P then Shift+S to reveal **Shadow Catcher**'s Position and Scale. Increase its Z Position value until it moves behind all the wheels, and adjust until the size of the shadow feels right for your virtual room. As you do so, the layer will appear smaller as it recedes into the distance; increase its Scale value as needed until the entire frame is filled

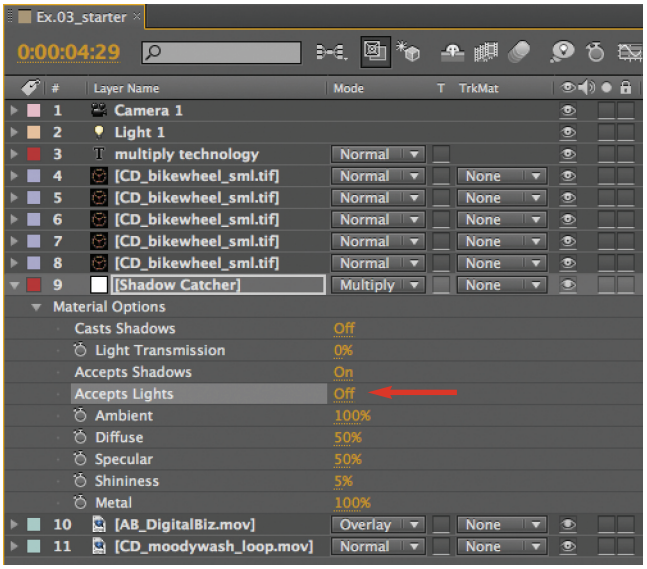
again. (It's okay to scale shadow catcher layers beyond 100% – the layer's scale does not affect the resolution of the shadow it catches.)

Step 5: Press Home to return to the start of the composition. As the camera moves, **Shadow Catcher** might no longer fill the frame. Increase its Scale value until it does. To be safe, scrub the current time indicator to make sure **Shadow Catcher** covers the frame during the entire comp.

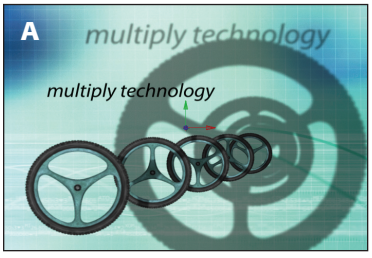
Step 6: Type AA to reveal **Shadow Catcher**'s Material Options. By default, Accepts Shadows is On, which is what we want. However, we don't want to pick up any shading falloff from the light – so set Accepts Lights to Off. The Shadow Catcher should now be evenly lit, except for the shadows.

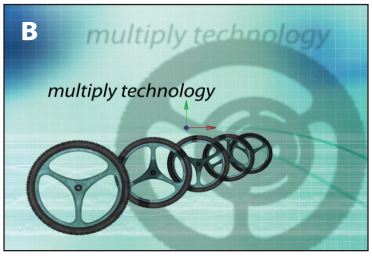
Step 7: Press F4 to reveal the Modes panel. Set the blending mode for the **Shadow Catcher** layer to Multiply. The shadows will now appear on your 2D background composite! RAM Preview to verify that these new shadows react to the animating camera position and text layer.

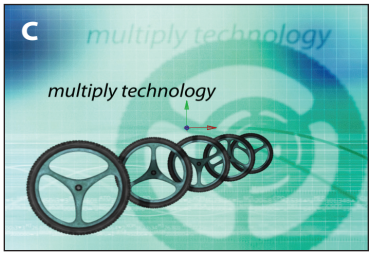
There are a few ways to further tweak the result. With **Shadow Catcher** still selected, press T to reveal its Opacity; lower this value to reduce the strength of the shadows on the 2D background. Try a different blending mode such as Color Burn to create a more stylized look. Increasing the Light Transmission parameter will cause the 3D layers to be projected



Steps 6–7: Set Shadow Catcher so that it no longer accepts lights and uses the Multiply blending mode.



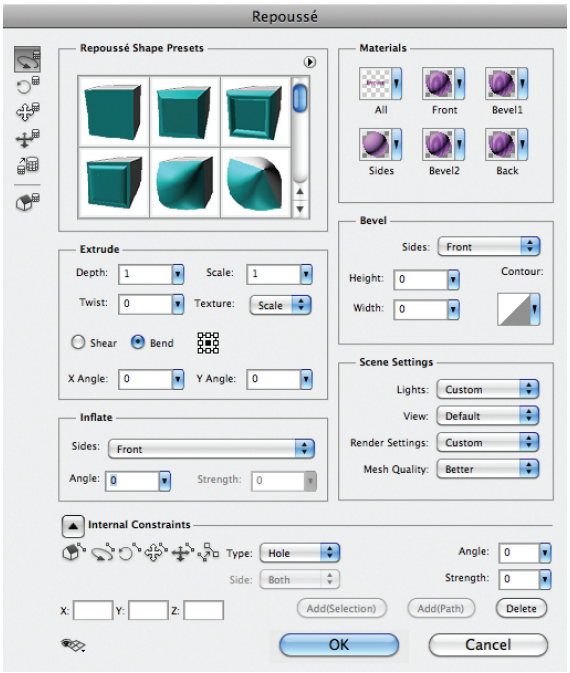


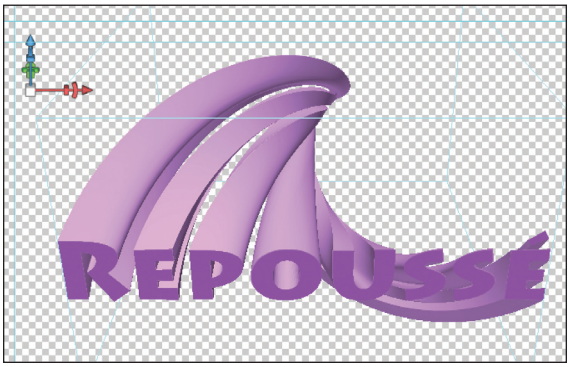


Casting shadows from the 3D layers onto the 2D background helps unify the scene (A). You can reduce the Opacity of the shadow catching layer to tone down the shadows (B), or even use a different blending mode such as Color Burn (C).

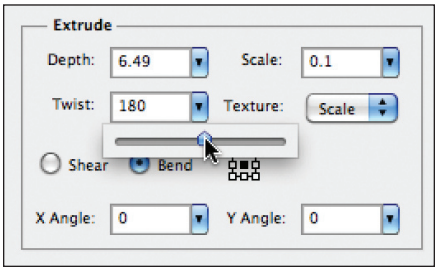
onto the 2D background (try it with layer 4, the most prominent bike wheel). And as with ordinary 3D shadows, you can increase the light's Shadow Diffusion to soften the shadows, or increase Composition > Composition Settings > Advanced > Rendering Plug-in > Options > Shadow Map Resolution to sharpen the shadows.

You can create more complex shadow catcher arrangements to cast more complex shadows. For example, **[Ex.06]** in Chapter 40 demonstrates how to correctly catch shadows on multiple surfaces in a 3D render.





Step 3: In addition to adding extrusion depth, the Extrude section (below) also allows you to scale, twist, and shear the extrusion (above).



Adobe Repoussé

In Creative Suite 5, Adobe built on the concept of Live Photoshop 3D integration by adding Repoussé – a powerful extrusion and beveling tool – to Photoshop CS5 Extended. Layered Photoshop PSD files created with Repoussé can be imported into After Effects and animated in 3D (with similar limitations as other Live 3D layers). Repoussé is explained in detail in Photoshop's Help file; here is a quick tour:

In Photoshop CS5 Extended:

Step 1: Open file **16-Parallel Worlds > 16_Chapter Sources > Repousse Text.psd**. It contains a simple line of text created in Photoshop.

Step 2: Choose 3D > Repoussé > Text Layer. Photoshop will tell you it has to rasterize the text; click Yes. The Repoussé dialog box will open, and the text will be extruded in 3D. Click and drag the text downward slightly so you can better see the depth of the extrusion.

Step 3: First focus on the Extrude section. Experiment with Depth, Scale, Twist, and the Shear/Bend section. Depending on your video card, it can take Repoussé some time to calculate the results. Once you have a feel for how these parameters work, click on the Extrude preset in the upper left corner of the Repoussé Shape Presets, and reduce Extrude > Depth to a more discreet value between 0.2 and 0.5.

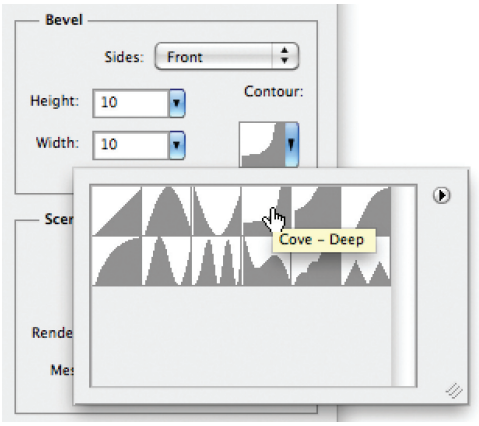
Step 4: Next, play with the Inflate settings. A good starting point is Angle = 90. Negative values cause the faces of your object to be hollowed out. Strength affects how the inflation is pulled out (or in), and is very sensitive – values well under 1.0 can introduce rendering anomalies with detailed selections.

Step 5: Reset Inflate > Angle to 0 for now, and have fun with the Bevel section. Setting Height and Width to 10 is a good starting point for this file; negative Height values cut into the face. The Contour popup gives you several different shapes to work with; the more detailed shapes work better on simpler sources with space between the outlines. Also beware of setting Width too high; thinner portions of the letters will overlap and cause artifacts.

Step 6: The Scene Settings are worth exploring. Under the Render Settings popup are several interesting choices, such as Wireframe and Shaded Illustration (return to Default when you're done exploring). Lights contains several default arrangements; Dawn works well with this example.

Step 7: Click OK to exit the Repoussé dialog. Make sure Window > 3D is open, and select **Scene** (it's at the top). In the Render Settings at the bottom, set Quality to Ray Traced Draft: The text will now render antialiased, with refined lighting effects like shadows. In the 3D window, you can again edit the materials applied to your object as well as the lighting. Note that you will *not* be able to alter the lighting in After Effects.

Step 8: Choose File > Save As; make sure that the Format popup in the Save dialog is set to Photoshop and that Layers is enabled. Rename your file "**My Repousse Model.psd**" and click Save. If a Photoshop Format Options dialog opens after clicking Save, enable Maximize Compatibility and click OK.

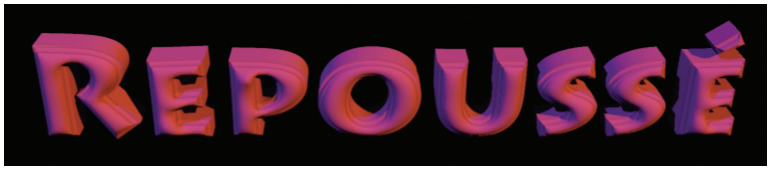


Steps 4–6: The Bevel section (above) creates the classic "beveled text" look; the Inflate section adds rounding to the faces (top left). The Scene Settings provide options for lighting and render styles (top right).

In After Effects:

Step 9: Back in After Effects CS5 and the project file **16_Example Project.aep**, select the **Ex.07 Adobe Repousse** folder in the Project panel. Then choose File > Import > File and select the PSD file you saved above (our version is saved as **16_Chapter Sources > Repousse Model.psd**). After clicking Open, a second dialog will appear. Make sure that the Import Kind popup is set to Composition – Retain Layer Sizes, and that the Live Photoshop 3D option is enabled. Then click OK. Two items will be created in the Project panel: a folder and a composition, both named after your file.

Step 10: Double-click the imported composition to open it (or our version [**Ex.07_starter**]). The layer arrangement is similar to the previous Live Photoshop 3D example, with a camera, controller, and layer with the Photoshop 3D effect applied. Press C to select the Camera tools and move around the text to verify it's not just another postcard in space.



Importing a Repoussé file as a composition results in three layers in After Effects (below). Toggle the Quality switch to Best for the layer with Live Photoshop 3D applied to see the ray-traced render (above).

Toggle the Quality switch for layer 3 (the one with the Live Photoshop 3D effect) to Best. The text will now be ray-traced, but the scene will also be a lot less responsive. Return Quality to Draft while you're posing and animating your scene, then make sure that the Render Settings popup for Quality is set to Best when you render (Chapter 42).

To edit a Repoussé layer, select the layer with the Live Photoshop 3D effect applied, choose Edit > Edit Original to return to Photoshop, then choose 3D > Repoussé > Edit in Repoussé. Save your file when done, and return to After Effects – the layer will update automatically.