excerpt from chapter fifteen

3D

multi-pass rendering

After Effects is used for many different purposes but the area in which it is probably most widely used is in the post-production of footage. For those of you unfamiliar with the term, this is when the produced footage, image and animation are put together and any effects; color treatments or graphics are added.

Quite often the compositor will have to mix 2D and 3D footage together at this stage, their job is to make sure that the 'joins' between these two worlds are seamless.

You'll often find, when talking to artists and designers that they tend to have a preference towards working in either a 2D or 3D environment. I've often over-heard individuals complaining that they feel 'uncomfortable' outside their chosen environment.

Being from a fairly traditional 2D back-ground myself, I have only begun getting into 3D animation quite recently, in fact my interest only really started grow-ing when working with some of the 3D concepts introduced in After Effects 5.

Here is a frame from a finished QuickTime movie that I will teach you how to create using a Cinema 4D multi-pass render, Zaxwerks Invigora-tor and a smattering of effects!

One of the things that in the past put me off some 3D animation was the fact that it was too unrealistically 'real', too perfect, shiny and polished. I prefer work that has more of an edge to it, you know, with a slightly grungy quality.

In recent years I've seen some really impressive 3D work, which displays these qualities. After researching the techniques used to produce these works I discovered that the all too important finishing touches were often added in post-production with applications such as After Effects. All the things that make a scene more realistic can be added after the 3D render is complete.

To make these 3D renders easier to edit and to make them more flexible you can render the image or movie out as a multi-pass render.

What is a Multi-pass Render?

A multi-pass renders each element of the scene as a separate pass, for example: below are some of the individual passes that can be rendered from Cinema 4D: depth, reflection, and diffuse values respectively.
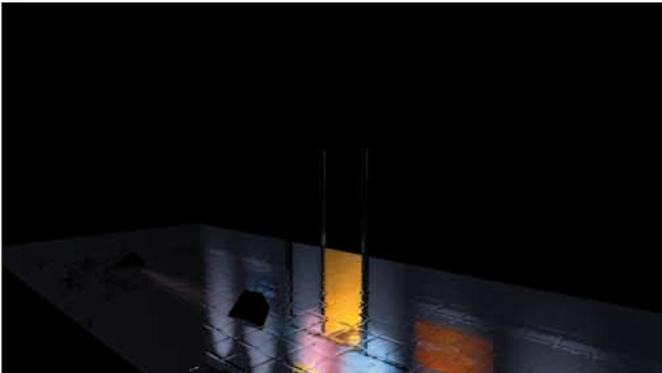
These passes are then composited together in a compositing programme such as After Effects where they can be adjusted using transformations, blending modes and effects.

We're going to take a look at a couple of techniques for re-composing these Cinema 4D multi-pass renders within After Effects.

I have recently become interested in learning more about 3D, in fact I'm currently trying to find time to spend with my two 3D applications of choice: Alias Wavefront Maya and Maxon Cinema 4D XL (C4D).

It may seem quite odd to you that I have two favorites but, up until fairly recently, Maya's price was out of the reach of most small production houses, it also has a complicated installation procedure. This makes it difficult to transport the software from one machine to the next, this is something that has to be done at times when freelancing. Whenever I work away from my studio I take my copy of C4D to install on the machine where I work (I also remove it from the same machine when I finish the job!!) Cinema 4D is an excellent, low cost alternative which can pretty much match Maya feature for feature, its interface is very similar to that of Maya. Plus it has some unique features, which we will take a look at in the following tutorials.

Tim Clapham, a very talented designer at HYPA solutions in Brighton, England and myself, designed these tutorials. Tim concentrated more on the Cinema 4D aspects whilst I concentrated on the After Effects side of things. In a way, this echoes the way that many real world studios work: one designer passing the 3D materials onto the post artist for effects and finishing touches.

There are two main sections to this tutorial. This is the first part of the tutorial; it shows you how to set up a scene in Cinema 4D. The second main section shows you how to adjust elements of this 3D scene in After Effects.

1 creating the floor texture

If you want to skip straight to the After Effects sections, please open the PDF file named AE_Multipass.pdf.

For the first part of this tutorial we shall be creating a tile texture to place onto the floor. This will involve only procedural channel shaders. This means that the texture will be created using mathematical calculations rather than bitmap images. The advantage to this is that no matter how close you get to the material it will never pixelate. Also it means the texture is saved directly within the scene file without any need for external image files. We will create the texture using all built in channel shaders that ship with C4D 7+. These include the excellent bhodiNUT smells like almonds shaders.

1 Open ClubFront_Start.C4D from the multipass folder.
2 Firstly go to the Material Manger and create a new material by selecting File > New Material. (see Fig.1)
3 Double-click the new material swatch to open up the Material Editor. Rename it 'Floor' by typing in the field at the top left of the Material Editor. (see Fig.2)
4 In the Texture section of the color channel (next to the blank text box) click on the little wing menu and select bhodiNUT Channel > bhodiNUT fusion. Then click on the edit button below to bring up the bhodiNUT Fusion dialog box. (see Fig.3)
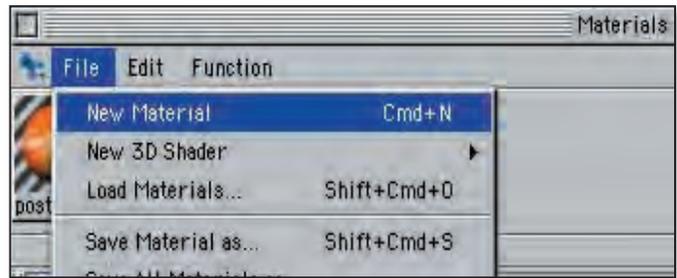
Figure 1: Cinema 4D's Material Manager
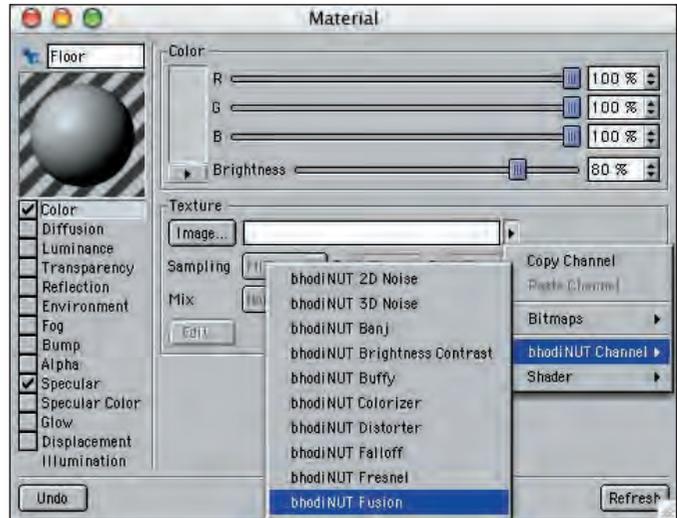
Figure 2: Cinema 4D's Material Editor
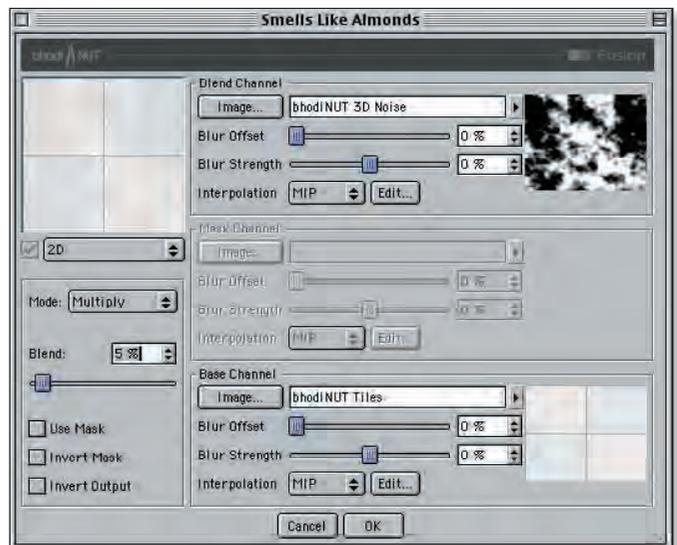
Figure 3: bhodiNUT's Fusion 'Smells Like Almonds' dialog box.

By using Fusion we are able to combine several textures together using masks and various composite modes. You can even use Fusion within Fusion to create texture trees. We'll use it to create our tile pattern and then roughen up the texture with some noise.

5 In the Fusion dialog box go to the base channel section at the bottom right and click on the little arrow and select bhodiNUT channel > bhodiNUT tiles. Click the edit button to bring up the dialogue box for bhodiNUT Tiles. (See Fig.4)

6 The tile shader is for creating various regular patterns including tiles.

7 Click on grout color and pick a neutral gray. We will make the tile colors slightly different to add variety to the texture.

8 Click on tile color 1 and select a light beige color. Click on tile color 2 and select a similar but different color to the color you selected for the first tile.

9 In the pop up list select squares as the shape of our tiles, have a look at the other patterns available while you are here, then go back to squares.

10 Set the grout width to 0.1% and the bevel width to 0.5%.

11 Lastly we need to scale up the tile shader so the tiles are not too small for our scene. In the global scale field enter 500%.

12 Click OK to return to the Fusion dialog box.

We will now create a noise texture to blend with the tile pattern. This will create a more interesting texture but more importantly it will help to break up the uniformity of the tiles.

13 In the Blend Channel at the top, click on the wing menu and select bhodiNUT 3D Noise. Click Edit to open the 3D noise shader which can been seen pictured in Fig. 5.

3D noise is one of the most valuable shaders in the bhodinut collection. It generates 3D noise that is totally seamless so therefore will tile infinitely. There are various types of noise you can generate and they can also be animated.

14 Set the global scale to 400%. Set the noise type as FBM and increase the contrast to 81%. Click OK to return to the Fusion dialog box.
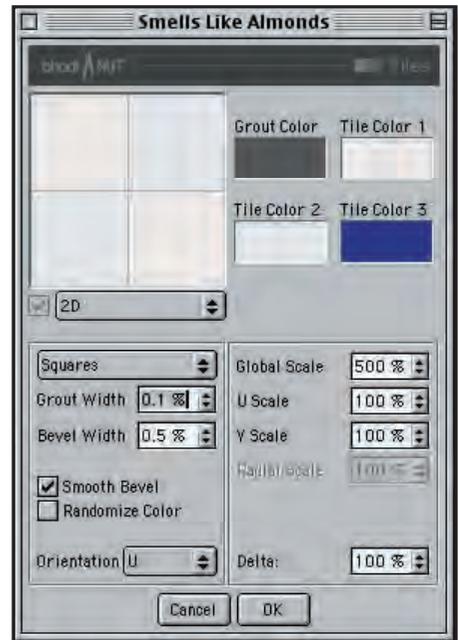
Figure 4: The bhodiNUT Tiles
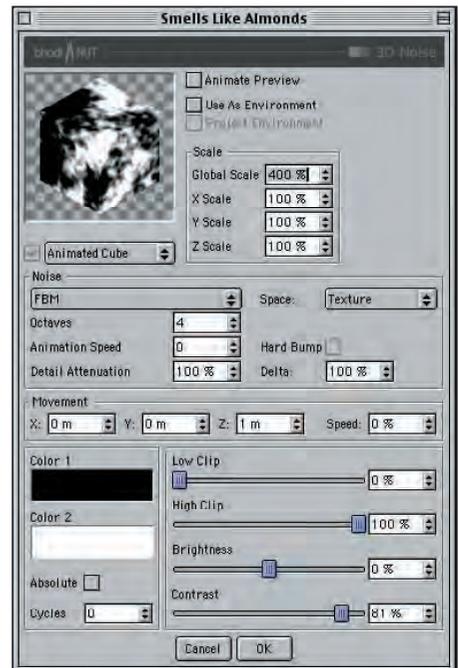
Figure 5: The bhodiNUT 3D noise

On the left hand side of the Fusion dialog box is the section that determines how the two channels are blended together using composite modes (add, difference, multiply etc). These should be familiar with most users who have used the blending modes in Photoshop or After Effects.

15 Select multiply as the composite mode. This will multiply the noise shader with the tiles shader. The result is far too harsh, if we lower the blend down to 5% it is much more subtle. This will be enough to randomize the look of the tiles just slightly.

16 Click OK to close the Fusion box.

17 In the bottom right corner of the material editor click the 'refresh' button. The material icon in the material manager updates with your new settings. Next we will add a bump map to the tiles to give them an illusion of a relief.

18 In the list of properties (left side of the Material Editor) click the checkbox next to the Bump property to switch the Bump channel on. (see Fig.6)

We need to match the bump with the color channel so that the places where there is grout in the color channel match the same areas in the bump channel. The easiest way to do this is to copy them from the color channel.

19 In the Properties list, click on the word 'Color' to jump back to the Color channel. In the Texture section, click on the little wing menu and select Copy Channel. This copies our Fusion settings including any shaders within Fusion.
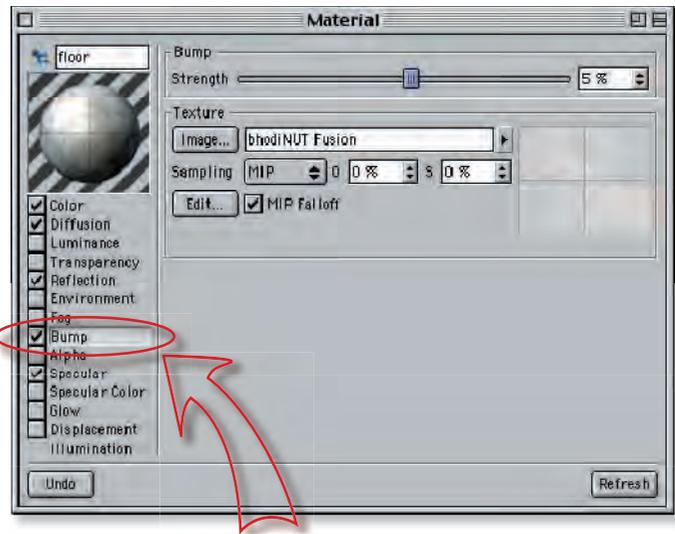
Figure 6: The Bump property in the Materials Editor
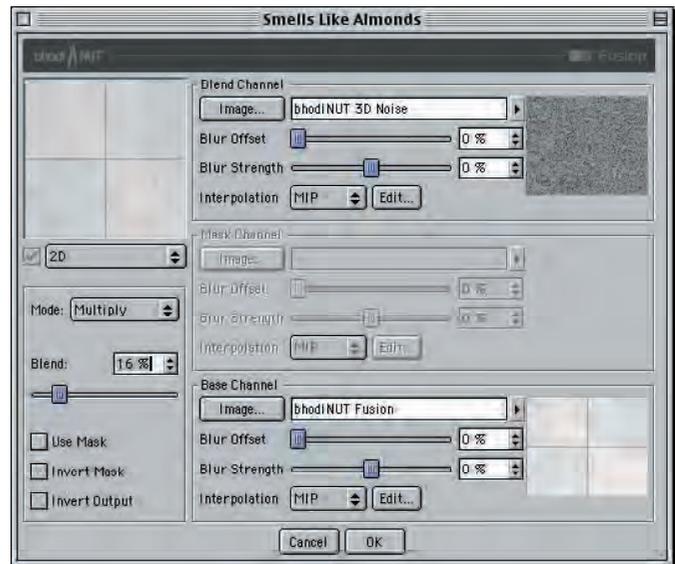
Figure 7: The Material Editor

20 In the Properties list, click on the word 'Bump' again to go back to the bump channel (see Fig.6),

21 Click on the wing menu and select bhodiNUT Channel > bhodiNUT Fusion. Click Edit to open the Fusion settings.

22 In the Base channel click on the wing menu and select Paste Channel. This will paste in the Fusion settings you just copied from the color channel (See Fig.7).

The reason we are adding this to another Fusion shader is to create another layer of texture to the bump, on top of the copied settings. This is an example of a simple texture tree.

23 In the blend channel at the top, click on the little arrow and select bhodinut channel > bhodinut 3d noise. Click Edit to open the settings.

Here I want to create a fine grain texture that will add to the realism of the bump and also it will help to diffuse any reflections (which we'll add later).

Figure 9: The Specular Channel

24 Leave all the settings at their default except for global scale. Change this to 10%. Click OK to return to the Fusion dialog box.
25 In the Mode pop up list (on the left) set the composite mode to Multiply and lower the blend to 16%. Click OK to accept these settings. We now have a rougher texture overall.
26 To make the material reflective click the checkbox next to the Reflection channel to make it active (See Fig.8).
27 In the Texture section, click on the wing menu arrow and select Paste Channel. This will paste in the same Fusion settings as you've used in the Color and Bump channels.

Figure 8: The Reflection Channel

28 Click Edit to open the Fusion settings. Increase the blend to 21% making the noise slightly more apparent.
29 Click OK. By using these settings again the tiles will reflect less in the darker areas (such as the grout).
30 We only want this to affect the reflection slightly so in the Texture section set the Mix value to 16%.

The amount of reflection is still far too high but we will leave it as it is and use the multi-pass rendering feature of Cinema4D to render the reflection separately later. This will demonstrate how much extra post render control has been added with the multi-pass render option.

31 Click on the checkbox for the Specular channel. This is where you can control the specular highlights of the texture (See Fig.9). The tiles need quite a wide flat specular value.
32 Set the width to 79% and height to 16%. Set falloff to 10% and inner width to 16%.
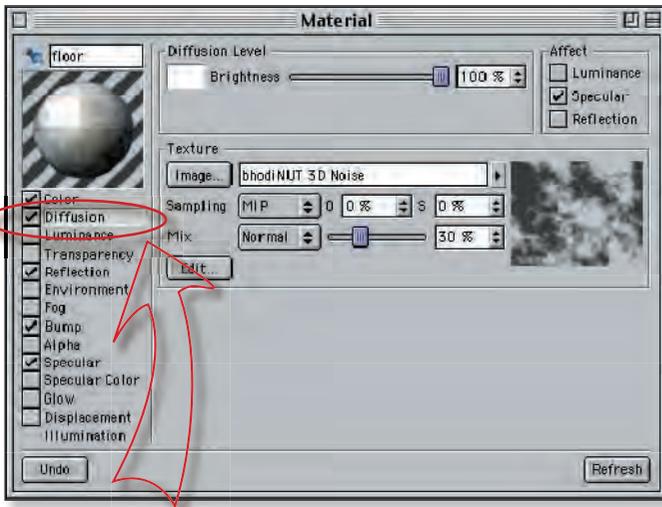
Figure 10: The Diffusion Channel

This should be sufficient to diffuse our tiles subtly, click OK to close the 3D noise dialog box.

34   In the texture pane of the diffusion channel set the mix to 30%. The tile texture is now complete so you can close the material window.

35   In the Material Manager (the strip along the bottom of the main window) you can see the new floor texture. Click on the Floor material swatch and drag it over to the Object Manager (see Fig.11).

36   There is an object called floor. Drop the material onto the little icon next to the word floor. This icon looks like a blue triangle with brown dots at its corners; this shows that the object is a polygon object.

Change these settings to get an understanding of how each slider controls a different parameter. It is much easier for you to experiment here and see the results than for me to explain them. But basically we have made a highlight that is quite wide yet not too bright. The falloff is gradual and the inner width gives you a flat area in the middle of the specular. The tile texture is nearly finished now.

30 Click on the Diffusion checkbox to activate this channel (See Fig.10). The diffusion channel does exactly what is says, it diffuses the texture. In the top right of the diffusion channel are 3 check boxes to say what is being diffused. Specular should be checked.

31 In the texture section click on the little wing menu and select bhodinut channel > bhodinut 3d noise. Click Edit to open up the settings for 3d noise.

32 Set the Global Scale to 500%. Select FBM as the Noise type from the Noise popup menu.

33 Set Contrast to 76%. Lastly make color 1 a dark gray and color 2 a light gray.

Figure 11: The Object Manager
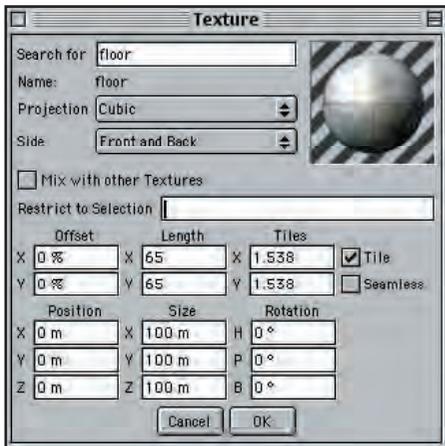
Figure 12: The Texture dialog box

When you drop your texture on to it a dialog box will open (See Fig.12). Here you determine how you would like to place this material onto this object.

37 In the Projection menu select Cubic. This will project the material onto the object as if onto the faces of a cube. This projection type works well as our floor object is a cubic shape (well, rectangular).

38 Make sure that the checkbox next to tile has a check in it. Set the length to 65% for both X and Y. Click OK.

On the left hand side of the Object Manager you will now see a small icon representing your tile material. This is your Texture tag. We have now tiled the floor!

39 Go to the Render menu>Render View (Control/Right mouse + R) to do a quick render of your scene, this will render the results of your work in the editor window.

NB If you see a Texture Error window informing you of missing files, just ignore it for now and click OK.

The tiles are going into the doorway, so to restrict the tiles to the floor outside we will use a selection set. I have already created this for you. In the Object Manager you will notice a small red triangle to the right of the floor object, this is a tag. (See Fig.13)

Figure 13: The Floor object's Tags

Polygon Selection tag

Texture tag

40 Double click it and you will see it is named *Outside*. This is a selection of polygons that are outside the building. By specifying this in the texture dialogue box we can place a texture only on these selected polygons.

41 To see the selection set select Restore Selection. In the Main window you will now see the area selected.

42 To restrict the tiles to this polygon double-click the tiles Texture tag. (See Fig.13) This brings up the texture window again.

43 In the Restrict to Selection text box type in the word, 'outside'. (See Fig.14)

44 Click OK and then do a test render again to see that the texture is now restricted to your selection. (Control/Right mouse + R)

45 In the main menu go to File>Save As. Save your Cinema 4D project to a new folder named *Finished C4D projects.*

Figure 14: Type the word 'outside' into the Restrict to Selection text box

2 creating the wall texture

The second texture we will make will be for the walls. This will make them look more realistic, let's start by adding our basic texture. Then, later in the tutorial you'll add your own graffiti and dirt to add to the realism.

1 From the Multipass>Cinema 4D projects folder, open the file named clubFront_01.c4d. this is a pre-saved version of the file that you just saved.

2 Start by going to the Material Manager and selecting File > New Material.

3 Double click this material to open the Material Editor.

4 Rename the material walls in the top left field. The color channel will be active.

5 Pick a color. A typical light beige outside wall color (R-100%, G-98%, B-94%) and brightness 85% (See Fig. 15).
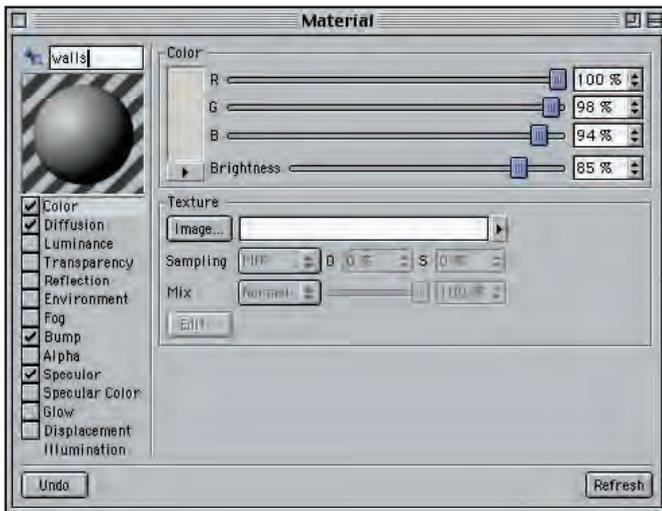
Figure 15: The Material Editor

6 Next click on the tick next to the Diffusion channel to activate it. Here we will add some noise to the texture to break up the uniformity and make the wall look more weathered.

7 Click on the wing menu and select bhodiNUT Channel > bhodiNUT Fusion.

8 Click the edit button to bring up the Fusion shader settings (See Fig.16).

Figure 16: The Base channel

9 In here we are going to combine two types of noise. In the Base channel at the bottom of the box, click on the wing menu and select bhodiNUT Channel > bhodiNUT 3D Noise.

10 Click Edit to open the 3D Noise settings (See Fig. 17).

11 Set global scale to 1500% so that the noise diffusion will be spread widely over the wall rather than lots of smaller blotches.

12 In the Noise section, select FBM as the noise type.
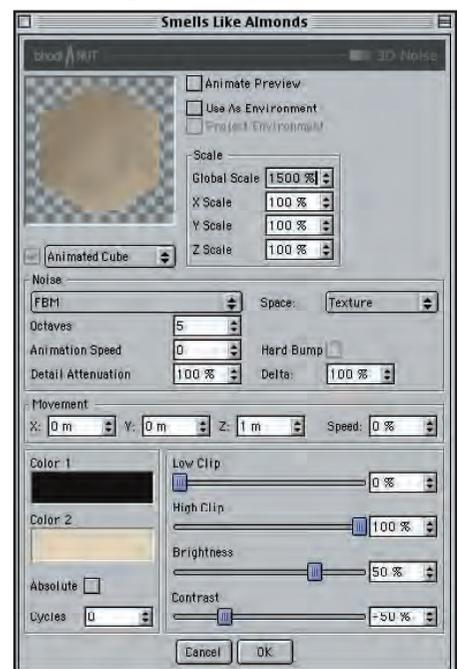
Figure 17: The 3D Noise settings

13 Set brightness to 50% and contrast to -50%. Click on the Color 1 swatch and choose a dark brown color (e.g. R-11%, G-7%, B-0%).

14 Click OK and then click the Color 2 swatch. Select a pale beige color similar to the materials base color.

15 Click OK to confirm this color and then click OK to accept your settings for the 3D noise shader.

16 Now back in the Fusion shader dialog box select the wing menu for the Blend channel (at the top of the box.)

17 Choose bhodiNUT channel > bhodiNUT 3D Noise and then click the Edit button to open the settings for 3D Noise (See Fig. 18).

18 This time we will use the default Noise, so make sure it is selected in the Noise popup list. This type of noise is much softer than FBM noise so combining the 2 noise types should create a good diffuse texture which will look quite random.

19 Choose a global scale of 500% and set the contrast to -50%. Select 2 colors for the noise as you did in the last step but make them very slightly different, a dark brown and a light brown. Click OK to close the 3D noise dialog box and return to the Fusion settings.

20 I chose to use *Screen* as my composite mode and I set the blend to 75%. By all means try different settings here to blend the 2 noise types. Once you are happy click OK to close the Fusion shader settings.

21 In the material editor I chose to set the Diffuse Mix value to 50% so that it wasn't too obvious; choose your own setting here.

22 Next click on the tick next to the bump channel to activate it (See Fig.19). The wall should have an overall even bump that will define the plaster and then there would be areas with small chips and imperfections. So again we are going to use Fusion to combine several noise types.

23 Select bhodiNUT Channel > bhodiNUT Fusion from the wing menu and then hit the Edit button to open the settings. For the Base channel we shall create a fine noise that can simulate a sandy kind of texture.
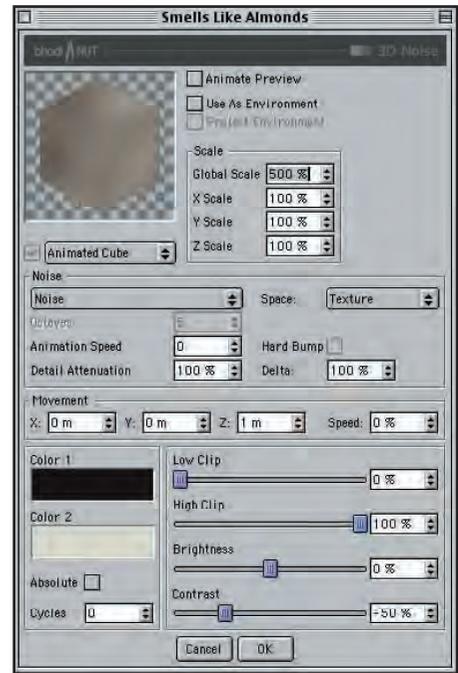
Figure 18: The 3D Noise settings

24 Select bhodiNUT Channel > bhodiNUT 3D Noise and click Edit to open the settings (See Fig.20).

25 Change the Global Scale to 4% and then click OK to close the box and accept the changes.
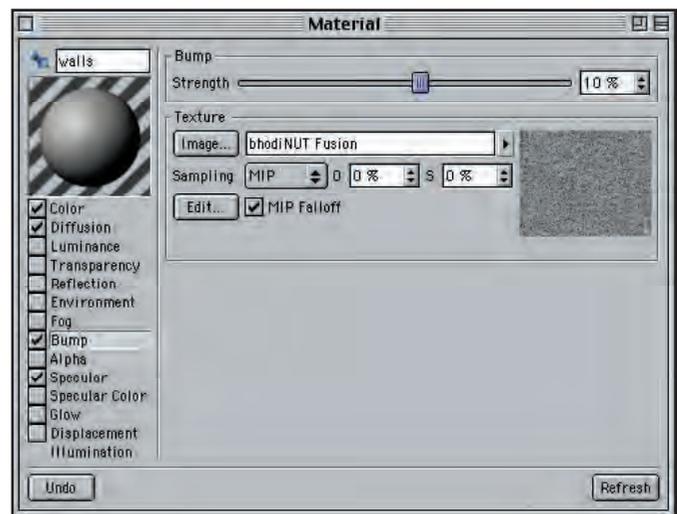
Figure 19: The Bump channel
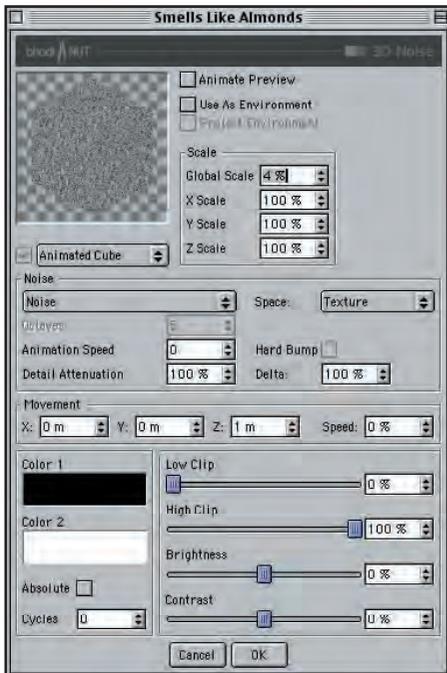
Figure 20: The 3D Noise settings

26 Back in the Fusion settings, for the Blend channel select bhodiNUT Channel>bhodiNUT 3D Noise and then click Edit to open the 3D Noise settings (See Fig. 21). This time we will make some random marks so that the surface of the wall appears to have some chips or imperfections.

27 Choose FBM noise and set the global scale to 300%. Choose a dark gray for color 1.

28 Now set the brightness to 40% and the contrast to 85%. In the preview you may only see a white cube but there is some noise there, believe me!

29 Under the preview there is a popup list where you can select the type of object that you wish to preview your texture on. Select Plane from the list. You should be able to see some small gray marks in the preview pane now.

30 Click OK to return to the Fusion settings.

We need to combine these 2 noise textures, I chose to use multiply with a blend setting of 85%. This should give us the illusion of an overall sandy/granular texture with the odd chip taken out. Click OK to return to the Material Editor.
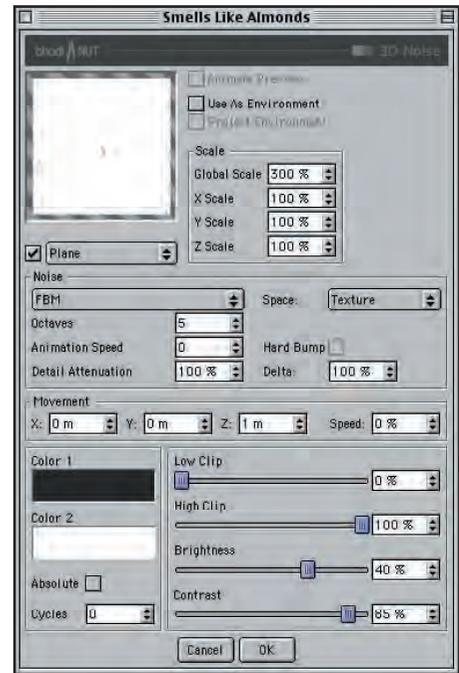
Figure 21: The 3D Noise settings

31 Select the Specular channel and set width to 80% and height to 15%. We now have a wide and flat specular (see Fig.21b).

32 Finally, close the Material Editor. You can now see your new Walls texture swatch in the Texture manager.

33 Go to File>Save As. Save the file to your Multipass>Cinema 4D projects folder as clubFront_02.c4d.
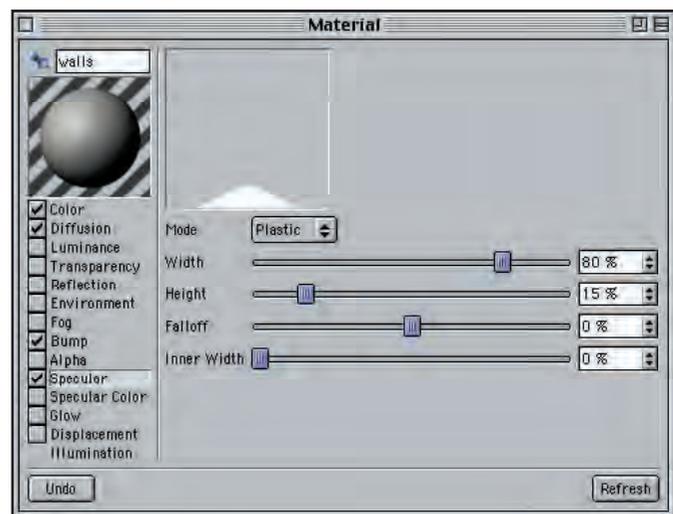
Figure 21b: The Specular settings

3 cleaning windows

Before we add graffiti and dirt to the walls to add to the realism, let's put some glass in our windows to remove the wall texture.

1 Open clubFront_02.c4d from Multipass>Cinema 4D projects folder. In this scene there are two objects that need the Walls texture, they are named *Big wall* and *Front wall*.

2 Drag the walls texture from the material manager and drop it on the icon for *Big wall* in the Objects editor. The Texture box will appear, when it does, click ok to accept the default settings.

3 Repeat this process, this time dragging the wall's texture to the *Front wall* object. Click OK in the Texture box to accept the settings.

On the front wall object there are three recesses above the door. These are intended to be windows. We need a glass material to place on there. Firstly however we will restrict the wall texture so it does not map to these polygons. We will do this using selection sets as we did for the tiles texture. This time we will create the selection sets.

4 Choose the Polygon tool and make sure the *Front wall* is the active object by clicking on it in the Object manager.

5 Hit F4 to toggle to Front view so that you can see the doorway and the three Polygons above it more clearly.

6 All three polygons should already be selected but if not, click on the first window polygon to select it. By holding down shift you can then add the other two polygons to your selection. When a polygon is selected it will change from blue to red. You will also know that it is selected because you will see a yellow dot appear in its centre, this is a symbol for the polygon normal (centre point).

7 Hit F1 to switch back to View 1 to confirm you have selected the correct three polygons (See Fig.22).

8 Go to the selection menu at the top of the screen and select Selection > Set Selection.
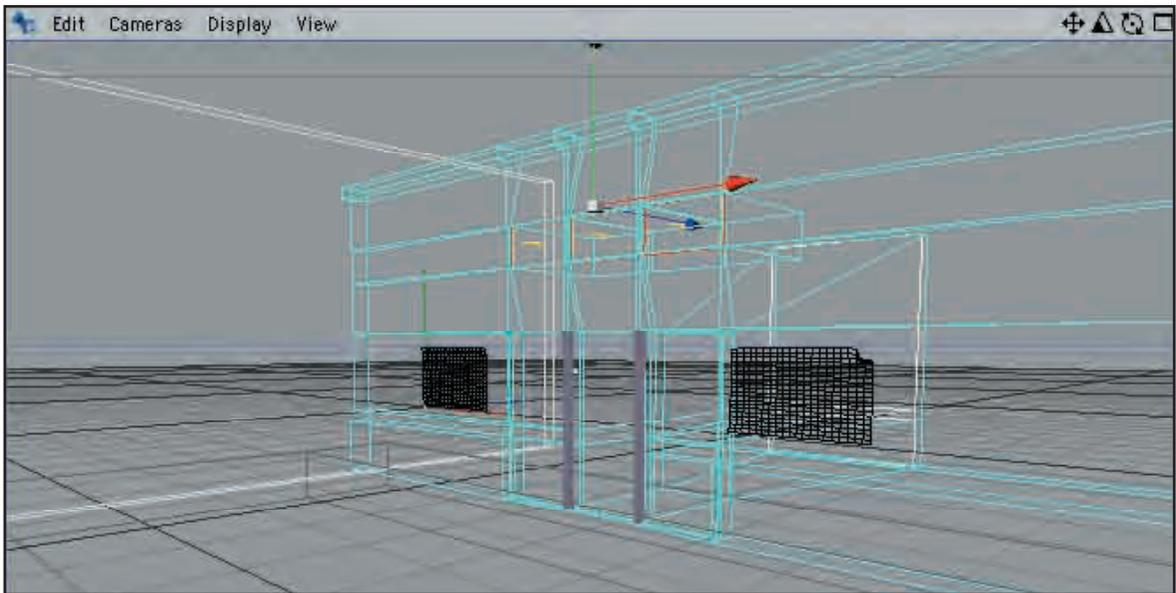
Figure 22: Your scene as seen in View 1

9 In the Object Manager the 'front wall' object now has a small red triangle to the right of it; double-click this icon and the Polygon Selection dialog opens.

10 In the Name field type 'windows' (Fig.23).

Polygon Selection

Name windows

Restore Selection

Select and Hide Others

Select Polygons

Deselect Polygons

Hide Polygons

Unhide Polygons

Cancel   OK
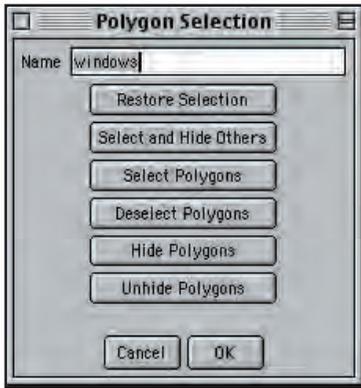
Figure 23: Polygon Selection window

11 Click OK to close this dialog box. You have saved a selection set for the windows.

12 Go to the Selection menu and choose Selection>Invert. This will select all the polygons except the windows set.

We can also save this selection set as walls, but before you do that you must deselect the current selection set tag otherwise you will replace it with this one.

13 On the Object Manager click away from the selected tag to deselect it (NB: It should **not** have a red selection square around it when it is deselected).

14 Now go Selection>Set Selection. A new selection tag is created without replacing the original, double-click the new tag and name it 'walls'.

Now we have created the selection sets we can restrict the wall texture to the wall without it affecting the windows.

15 To do this double-click the Front Walls texture tag.

16 In the Texture dialog box that opens type the word 'Walls' in the Restrict to Selection field. Click OK to accept the change, this will ensure that the texture is only applied to the Walls selection, not to the windows.

The windows need a texture that is semi-transparent and gives the illusion of light emitting through it. This will be quite a simple texture to create.

17 In the Material Manager go to File>New Material to create a new material swatch.

18 Double-click the new material swatch and name it 'Glass'.

19 Uncheck all of the attributes on the left side except for Color and then click on the word *Color* to make it active.

20 To simulate the warmth of the interior lights we shall use a yellow for the glass.

21 For the Material Color choose a color that is a light yellow (e.g. R-100%, G-95%, B-40%; Brightness - 100%) (See Fig.24).

Material

Glass

Color
R ━━━━━━━━━ 100 %
G ━━━━━━━━━ 95 %
B ━━━━━ 40 %
▶ Brightness ━━━━━━━ 100 %

✓ Color
☐ Diffusion
☐ Luminance
☐ Transparency
☐ Reflection
☐ Environment
☐ Fog
☐ Bump
☐ Alpha
☐ Specular
☐ Specular Color
☐ Glow
☐ Displacement
  Illumination

Texture
Image...
Sampling MIP   0   S
Mix Normal   100 %
Edit...

Undo   Refresh
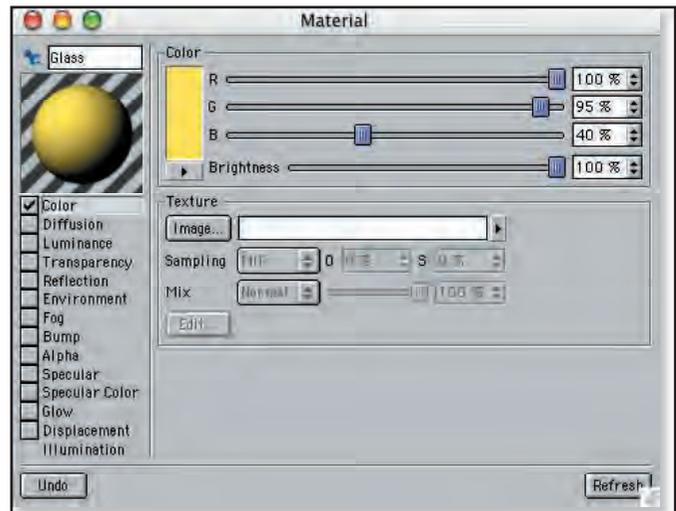
Figure 24: Activate the Color channel

The next shader we shall apply is part of the bhodiNUT 'Smells Like Almonds' collection. We shall use the luminance channel to give the illusion that light is emitting from the windows.

22 Click the checkbox next to the luminance channel to activate it.

23 In the Texture section wing menu select bhodiNUT Channel>bhodiNUT Banj and then click Edit to open the settings for Banj (See Fig.25).

Banj allows you to gather illumination from the back of a surface. This will allow light out of the windows yet will not allow us to see inside.

24 Click on the Color swatch and choose a yellowy-orange color (e.g. R-100%, G-85%, B-20%).

25 Set the Illumination value to the maximum value of 80%. We don't want shadows so leave the rest of the settings as they are and click OK.

Figure 25: Banj settings

26 Click on the checkbox next to the transparency channel to activate it (See Fig. 26). We will have slight transparency on the front face so that you can just see some tone on the back wall through the window. Again choose a yellow for the color. I chose R-100%, G-80%, B-0%. The material is far too transparent so set the brightness to 20%.
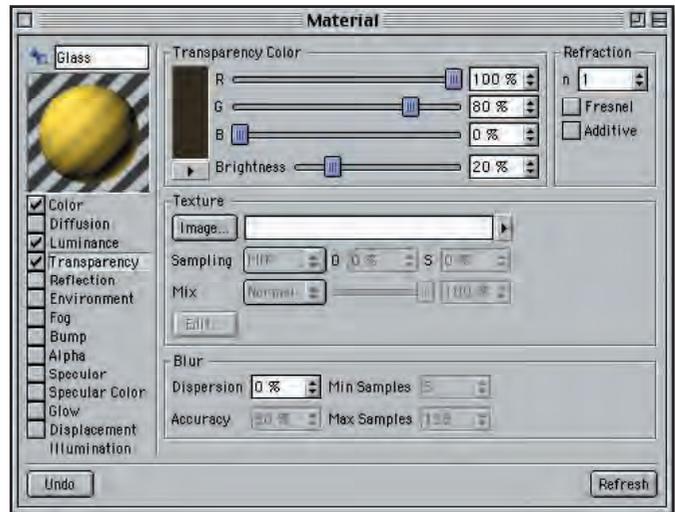
Figure 26: Adding Transparency

27 We have finished with the Material Editor so close its window.

28 Locate the Glass material in the Material Manager and drag it onto the Front wall object icon in the Object Manager.

29 When the texture dialog box appears, type 'windows' in the Restrict to Selection field (See Fig. 27).

30 You can leave all the other settings at their default. Click OK. The window texture is now applied to the front wall object but restricted to the selection set we created for the window polygons.

31 Go to File>Save As. save the file to your Multipass>Cinema 4D projects folder as clubFront_03.c4d.

In my finished project I have taken an extra step of adding the two panels adjacent to the doorway to my windows selection. See if you can work out how to do this after saving the file.
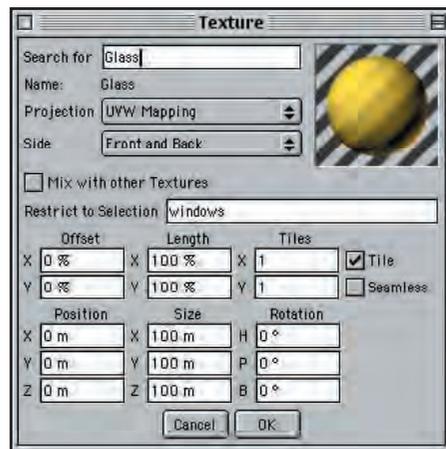
Figure 27: Restricting the selection to the windows polygons

4 playing dirty with graffiti

Finally, let's add some extra realism to the Big Wall object by adding some graffiti. This is an exercise in using alpha channels within textures. The technique we will use would be the same if you were sticking a label on a bottle, it will also show you how to use bitmap images within your textures.

Included with the project files are also several bitmap images. These are stored in the Multipass>Cinema 4D projects> 'Tex' folder.

1 Open clubFront_03.c4d from Multipass>Cinema 4D projects folder.
2 In the Material Manager go to File>New Material to create a new material.
3 Double-click the material and name it graffiti. Make sure that the only active channel is Color by unchecking any other properties in the list.
4 Click on the Color channel to make sure it's active and then click on the Image button to load an image into this channel. You will be presented with a standard system open file dialog box.
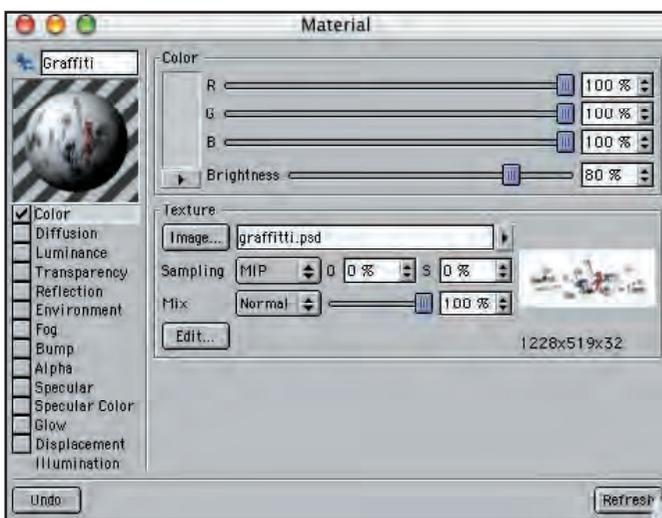
Figure 28: Building a Graffiti texture

5 Locate the Multipass >Cinema 4D projects>Tex folder and then select 'graffitti.psd'. (See Fig.28)

This image will then load and you'll see it in the preview. Before we do anything else we need to isolate the graffiti from its background otherwise we will end up with a big white square covering our wall texture, to do this we need to use an alpha channel.

alpha channels

An alpha channel is a fourth channel which can be saved within an image (the other three channels being Red; Green and Blue color channels). It is a grayscale channel which represents the transparency values of an image.

Basically where ever the alpha channel is black it will make the material completely transparent and where it is white it will be completely opaque. All the grays in-between will be at various levels of transparency depending on their value.

Understanding channels is essential when working in graphics or animation. If you haven't done so already, check out the **01_Technical.pdf** document on the Creative After Effects 5.0 CD ROM (Extras folder) to learn more about channels.

6 Click on the checkbox to activate the Alpha channel (See Fig.29).
7 Click the wing menu in the texture pane and select Bitmaps>Graffiti.psd.
8   Make sure that the box that says Image Alpha is checked. Notice that doing this has made the background of the graffiti transparent in the preview window.
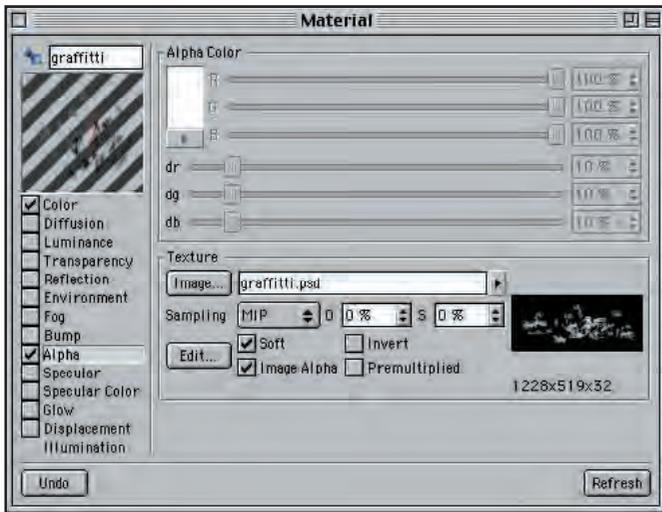
Figure 28: Building a Graffiti texture

In this case the alpha channel is embedded in the image, which is why we selected Image Alpha. Alternatively you could use a separate grayscale image to create areas of transparency.

Not all image formats support embedded alpha channels but Photoshop files do. An image with an alpha channel is defined as RGBA, where the RGB stands for red, green and blue and the A stands for alpha. There is also more information on alpha channels and how they can be used in Cinema 4D in the C4D manual (pages 410 & 511).

9   Close the Material Editor.
10 Drag the graffiti texture from the material manager onto the icon for the 'Big Wall' object. The texture dialog will open (See Fig.29).

11 From the Projection Type popup list select Flat. This will ensure our graffiti is flat on the wall.
12 At the bottom of the Texture box are 3 sets of fields for Position, Size and Rotation. For position set Y to -226 and Z to -397.
13 In the Size fields at the bottom set X to 614m and set Y to 259.5 m. This is a 2D texture so the Z dimension is not relevant.
14 Lastly in the Texture box set the H rotation field to 90º. This will ensure our graffiti texture is at the correct angle for the wall.
15 Click OK to confirm these settings.
16 Go to Render>Render view to see the grffiti applied to the side wall in the scene.
17 Go to File>Save As. save the file to your Multipass>Cinema 4D projects folder as clubFront_04.c4d.
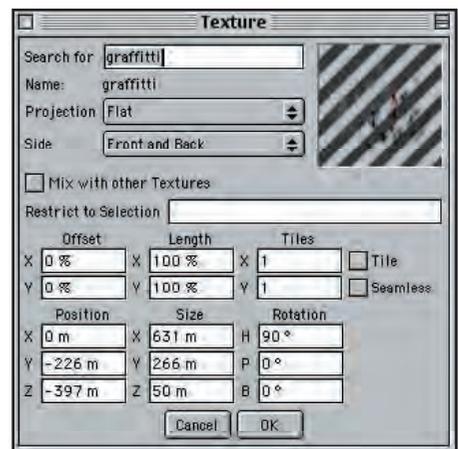
Figure 29: The settings for the Graffiti texture

5 Animating the camera

As this tutorial is aiming to cover the newer features of Cinema 4D I have already animated the camera. However I would like to explain the technique that I have used so you can use the same technique in your work.

Cinema4D has some very sophisticated and complex animation tools, and for some people they are not surprisingly quite mystifying! I learned the following method from an internet forum, a regular poster there, 'JeremyW' has a website which I would strongly recommend visiting. The technique I have used is described there in more detail so make sure you take a look: http://www.jeremyw.com/C4D_Stuff/C4D_Links.html

Basically you create several Null objects, one for each main camera move. You then make each Null a child of the next Null, with the camera being the final child (See Fig.30).

Then instead of animating the camera you animate each null in turn. By using this technique you create a separate Position, Rotation etc. sequence for each camera move.

You may be thinking "why is this advantageous to me?" Well if you've ever struggled with Cinema 4D's 3D space or time curves then this will make your life much easier. By creating a separate sequence for each camera move it is much easier to ease in and out and create a smooth motion.
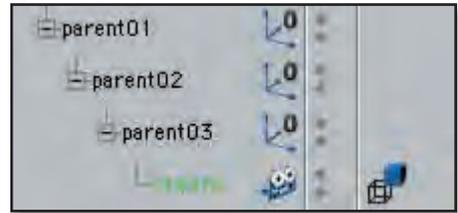
Figure 30: Parental heirarchy for the camera

1 Open clubFront_04.c4d from Multipass>Cinema 4D projects folder.
2 In the scene open the Timeline by selecting Window> Timeline.
3 Scroll down until you see the hierarchy that starts with parent 01.
4 If it's not already visible you can expand this group by clicking on the small cross to the right of the text to see all the child null objects and the camera as the final child.
5 Each null object has a rotation and position sequence. Notice that they all overlap slightly.
6 To see the Time Curves as they appear in the diagram, go to the Timeline menu and select Window > Time Curves. (See Fig.31)
7 If you click on parent 01 you will see a group of graphs appear in the right of the window. Hit the Green preview button to preview the camera move. Drag the Time Marker back to frame '0' when you've finished previewing.
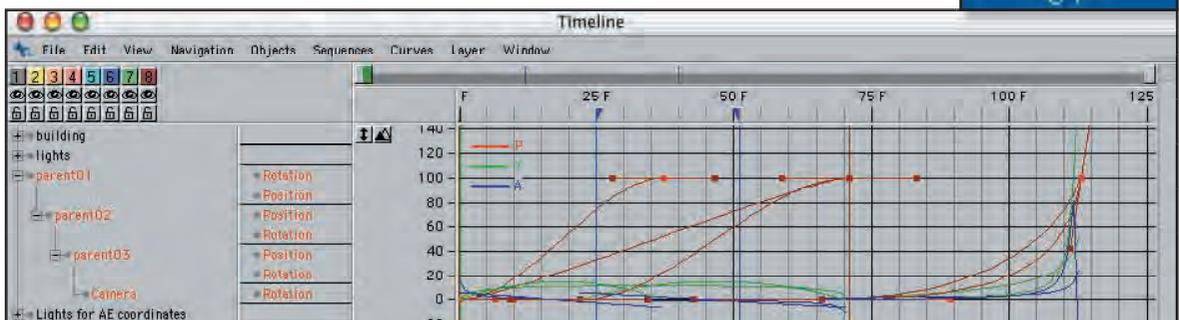
Figure 31: Parental heirarchy in the Timeline, notice the camera animation paths

8 Click on the Position or Rotation track of each null object individually (parent01, parent02, etc.) to see that each sequence has its own curve (See Fig.32).

9 These curves are simple 'S' shapes. Essentially the curve represents the speed of the movement, the steeper the curve the faster the motion whether it be Position, Rotation, or any parameter.
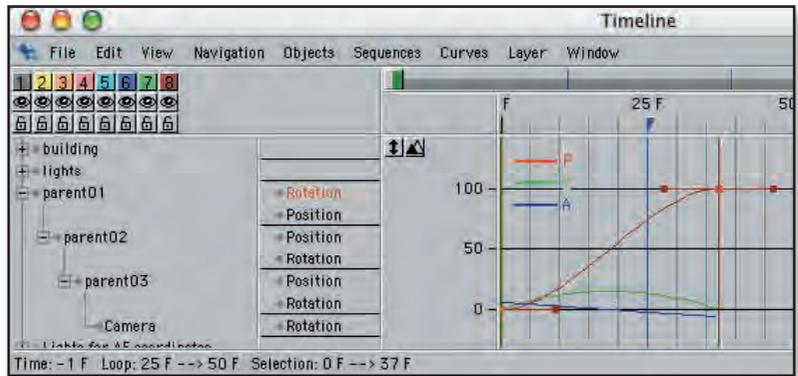
Figure 32: Individual Rotation track curve for Parent01

By understanding this principle you can see that the movement starts slowly as the curve is quite horizontal, and then accelerates to a linear motion (the diagonal section of the curve) and then finally it gradually slows again as the curve becomes horizontal again.

By treating each sequence like this you can control how much you ease in and out of each move. Then by taking each sequence and overlapping them slightly you can ease in and out of the different moves you have created, this creates a smooth overall camera animation without any harsh transitions. It also gives you precise control over each individual move so you can finely tune your animation velocity. This technique makes cinema4D time curves much more friendly.

Using the Camera settings, we can create a depth map that we can use in After Effects to adjust the amount of depth of field (DOF) in the scene. Cinema4D applies DOF as a post-render effect; this works in a similar way as applying a filter to an image in Photoshop after you have taken the photograph.

Consequentally you are left with little control over this, once you have rendered your images this DOF is applied. To make this render more flexible it would make more sense to render a sharp image and then add the DOF in post-production which is what we will do in the following tutorials. This way you have a sharp render and you can control the level and depth of blur in a much more versatile way. Also, maybe more importantly you can render various levels of DOF much more quickly to try out different looks.

Another thing that makes adding DOF in post an advantage is that you can simulate rack focus more easily, that is changing the point of focus from one object to another through DOF.

1 To set the DOF double click the camera icon in the Object Manger. This will open a new window containing the Camera settings (See Fig.33).
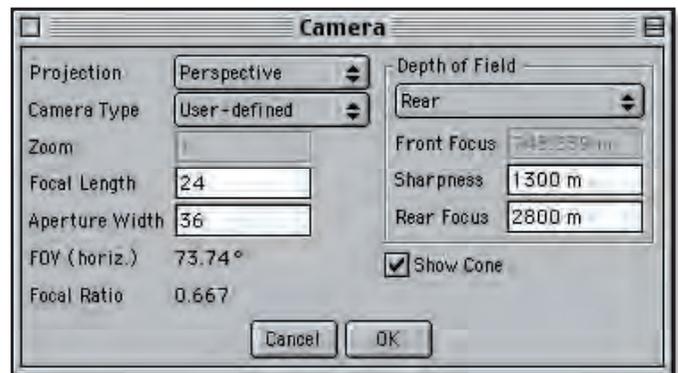
Figure 33: Camera settings box

2 On the right side of the window you will see the Depth of Field section which contains a pop-up menu, click there and select Rear from the list of choices. This will mean we are defining an area to the rear of the point of focus that we want to blur.

The three fields underneath are quite self-explanatory: The first (Front Focus) is grayed out, as we have selected rear focus only. It refers to the point at which objects in the foreground will be completely blurred. The second value, (Sharpness) defines at which point the camera is in focus. The last (Rear focus) defines the point at which the objects beyond the point of focus are completely blurred.

We will use these camera settings to create a depth map and will apply the DOF in post rather than using the Cinema 4D DOF effect.

3 Change the 'Sharpness' to 1300m and the rear focus to 2800m. This creates a fairly even transition of depth for this scene.
4 Go to File>Save As. save the file to your Multipass>Cinema 4D projects folder as clubFront_05.c4d.

These parameters will vary from scene to scene so the best way to understand them is to experiment. The way I remember it is that the furthest object must be just reaching white, the point of focus should be black and the nearest point to the camera should be just reaching white again (front & rear focus). The post blur effects that you can apply will take this brightness level and blur the image according to its level of brightness, i.e. dark - in focus and light - blurred.

6 rendering multiple passes

Now the scene is complete we are going to output the animation ready for importing into Adobe After Effects 5.5. Cinema4D will create a file that you can import into After Effects. This will contain a ready-made composition containing all the multi-pass layers layered correctly with the corresponding composite modes already applied.

As I mentioned at the start of these tutorials the multi-pass feature in Cinema4D enables you to export separate layers for post editing of shadows, reflections, DOF etc. The multi-pass feature enables you to finely tune the look of your image or movie without re-rendering the 3D, just by adjusting each layer in post production. Multi-pass can also output a depth map that you can use in post for adding depth of field.

Cinema4D will also export camera and light data from the scene and these will imported into After Effects' own cameras and lights. By using multi-pass to export information on these elements you can change the effect of your original lighting setup or match camera moves with new, composited elements in the scene.

We will also be outputting an RPF sequence. RPF files can contain extra information about your 3D scene. They are capable of including Z-depth information; Object ID; UV coordinates; plus other information. After Effects has a keyframe assistant designed to import camera animation data from RPF files. I'll show you how you can use this to import the Cinema4D camera path and apply it to our After Effects camera.

Another useful feature of multi-pass is the ability to render object buffers; using render tags on the objects and specifying a number for each object achieve this. In the multi-pass render settings you can then output a unique alpha image for each object specified. This means it is easy to isolate particular objects in post-production, if for instance you wanted to add a glow around a specific object but needed the control and speed you would get in After Effects.

1 Open clubFront_05.c4d from Multipass>Cinema 4D projects folder.

2 Open the Scene Render settings by selecting Render>Render Settings. The first section you will see is the General section, a summary of your settings Leave this as it is (See Fig.34).

3 Click on Output in the list on the left. This is where you decide the resolution and frame rate of your output (See Fig.35). This scene is set up as a 16:9 composition.

Figure 34: General Render Settings

As I work in the UK I will use settings that will translate easily to PAL. Normally for a widescreen PAL render I would output my scene at 1024 x 567 square pixels. For this project I chose to use half these dimensions, 512 x 288 pixels (to speed up downloads the movies that are available from the website are 320x180, 8 fps).

4 In the Pixel section, change the settings to 1:1, this will produce a square pixel aspect ratio.

5 Click on the Frames popup menu and select *All Frames*.

6 Leave Field Rend at None as we won't need to render fields.

7 I chose 25 frames per second as my frame rate as that is the standard for PAL, however you can choose the frame rate that suits you (e.g. NTSC 30fps).

8 Click onto the Save section (See Fig.36). Make sure there is a check in the box next to Save Image.

9 Now click on Path. You will be presented with a standard system save dialogbox. Navigate to the location on your hard drive where you wish to save the render. Create a folder named 'My Multipass 'to save the all the rendered files into.
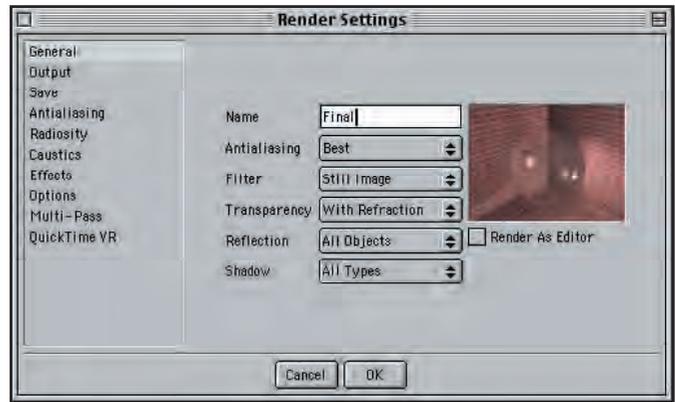
Figure 35: Output Render Settings
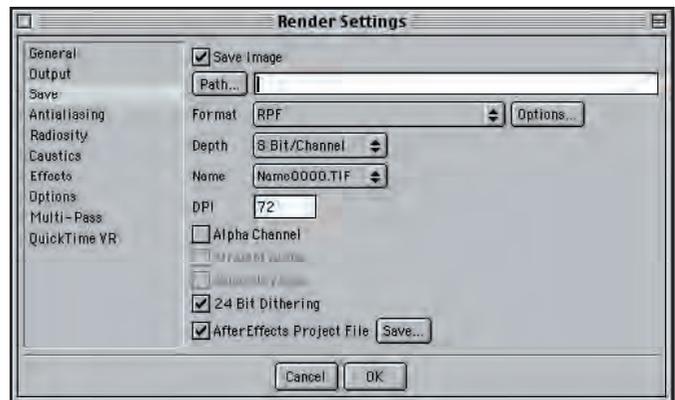
Figure 36: Save Render Settings
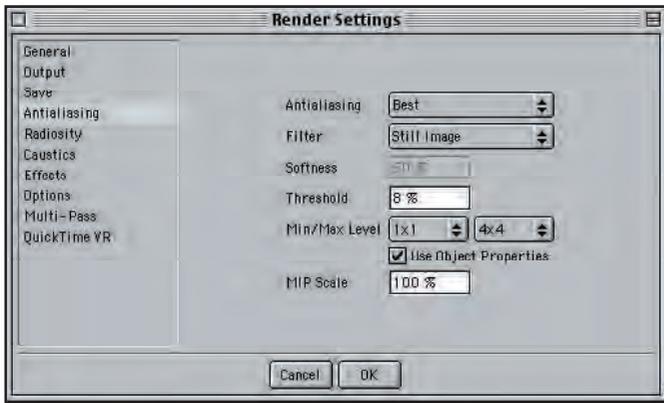
Figure 37: Antialiasing Render Settings
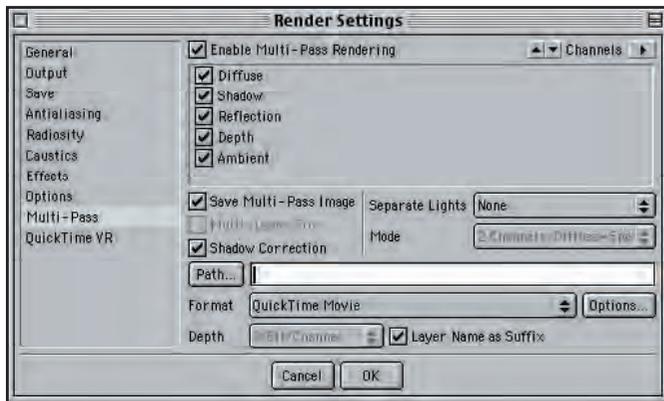
Figure 38: Multi-pass Render Settings

10 Within this folder create another new folder, name it 'RPF'.

11 Click Save to return to the Render Settings Save section.

12 From the Format popup menu select RPF. We are outputting the RPF file format so we can use the After Effects Keyframe Assistant to import the camera information from C4D.

13 Click on the Options button to see all the options that can be included with the RPF file. Click OK after looking.

14 At the bottom of the Save settings is a check box to save an After Effects project file, check this box. This will save the file that can be imported directly into After Effects (as long as you have the correct plug-in installed – more about this later).

15 Click on the *Save* button and choose to save this file into your new *My Multipass* folder (NB: not the RPF folder!)

16 Go to the Antialiasing section and select Best from the popup menu (See Fig.37).

17 Now click Multi-pass to move to that section (See Fig.38).

18 Enable Multi-pass rendering by checking the little box next to the words, 'Enable Multi-pass Rendering'.

19 In the top right of the Multi-pass section (where it says *Channels*) there is a wing menu to the right of the word *Channels*. If you click here you can select the multi-pass layers you want to output from the popup menu.

20 First of all, select *Diffuse*; this ouputs a layer that contains the diffuse color.

21 Go back to the menu and, this time select *Shadow*, this will create a layer just with shadows. This is useful if you may need to soften the shadows or change the shadow color in post.

22 Next, choose *Reflection*. This layer will contain all the reflective information so we will be able to make the final reflection more subtle.

23 Finally, add *Depth; Ambient; Refraction; Atmosphere; Material color* and *Illumination* to the list of items.

24 At the bottom of the Multi-pass section click on the *Path* button to choose a destination to save your multi-pass render. Navigate to the My Multipass folder and create another new folder within it named 'Movies'. Click Save to save all the multi-pass movies into a separate Movies folder.

25 Choose a file format, I chose QuickTime movie, but you may wish to choose another format depending on your operating system.

26 Click OK to leave the Render Settings box and then go to File>Save As. save the file to your Multipass>Cinema 4D projects folder as clubFront_06.c4d.

27 Now select Render > Render to Picture Viewer to render the animated scene to disk. In the next tutorial (AE_Multipass.PDF) we'll import this file into After Effects for post-production.