

Tutorial: Using *exrTrader* to do a simple comp

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Here's a (fairly) simple tutorial to give you an idea of what you can do using *exrTrader* to output a number of different passes and how you'd put them all back together again in Photoshop CS2.

I'm using CS2 in this tutorial for a couple of reasons – firstly, as a LightWave 3D user it's pretty likely you already use Photoshop for image editing and texture painting and secondly, with the introduction of CS2, Adobe's image editing software now supports 32 bits-per-pixel images including OpenEXR – it does have a few quirks but we'll cover those as we go along. If you're using Photoshop CS, you can still follow along by using ILM's OpenEXR plugin for Photoshop – you can download it at www.openexr.com



Chess scene rendered out in passes and composited in Photoshop CS2

Above you can see the composite we'll create using LightWave 3D 9, *exrTrader* and Photoshop. If you want to render the scene yourself, you can download the LightWave (version 9 only) scene files, objects and images (2mb) from <http://www.survivorsdiary.com/exrTraderLW9Scene.zip>

If you just want to get the .exr images to follow the Photoshop part of this tutorial, you can download a .zip (11mb) containing them from <http://www.survivorsdiary.com/exrTraderEXRs.zip>

About buffers, passes and layers

Before we proceed, let's take a quick look at the terminology involved. *Buffers* are generated internally when a 3D package such as LightWave renders an image. There are many different types of buffer available as detailed in the *exrTrader* manual. When we render these out, we refer to them as *passes* i.e. one fairly common type of pass you may have heard of is the so-called 'beauty' pass – this is simply a combination of diffuse shading and raw colour. By splitting a render into its component passes we have a great deal more control over the final image at the compositing stage as we'll see a little later.



Diffuse Shading Pass



Raw Colour Pass

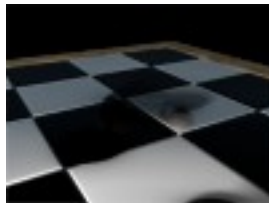


Reflection Shading Pass



Specular Colour Pass

Often, 3D artists use the terms *passes* and *layers* interchangeably when they actually mean something quite different – layers are elements that are rendered separately so that they can be more easily manipulated in compositing. A common example would be a background (BG) layer – this might be rendered out as-is with foreground elements (such as characters) rendered in passes to give a greater control over lighting. Separating the shot elements this way allows a compositor to easily reposition elements or introduce new elements between them (visual FX for example) without needing to re-render the shot.



Background (BG) Layer



Foreground (FG) Layer



Combined Layers

In this tutorial, rather than render layers we'll be using *exrTrader* to export four sets of passes – we'll use these to assemble two comps – one for the chessboard and one for the pieces. For a simple example like this it's probably overkill but it should give you a good grounding in how to use *exrTrader* and Photoshop to composite your work.

In this tutorial, a certain amount of LightWave 3D knowledge is assumed – it's not a complicated tutorial but if you're new to LightWave and unsure of how to load scenes, specify output directories and render scenes then it's worth looking these things up in the LightWave 3D manual before you proceed.

Below we'll take a closer look at some of the more useful passes *exrTrader* can output for us so that we have a better idea of how they'll be used in our final comp.



Diffuse Shading (DiffShade)

This pass represents just the effect of diffuse lighting in your scene – not to be confused with the *Diffuse Colour* and *Diffuse* passes. LightWave 3D has an annoying quirk in that it renders shadow, radiosity and ambient occlusion effects into its Diffuse Shading buffer so for this tutorial I've set up two separate scenes – one with shadows on, the other with shadows off so we can get a nice, clean diffuse shading pass.



Raw Colour (Raw)

Fairly self-explanatory – the Raw Colour pass represents just the diffuse colour of the objects in your scene – once it's in your comp you can change the hue, saturation and value of the Raw Colour pass to change the look of your rendered elements – very handy for colour corrections.



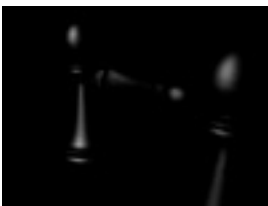
Reflection Colour (Refl)

This pass shows the reflections as they appear in your scene – *exrTrader* can also output a *Reflectivity* pass which represents the reflectivity *values* of the surfaces in your scene – if you made your surfaces 100% reflective, you could use the Reflectivity pass to matte them to their correct levels and adjust them between 0% and 100% reflectivity. Using just the Reflection Colour allows you to reduce reflections but *not* increase them.



Shadow

Another self-explanatory one - the Shadow pass contains all the visible shadows in your render. This is useful as it allows us to lighten and darken our shadows in comp as well as blurring them to give them softer edges and/or less noise (in the case of area lights). As mentioned above, shadow data is also written into the Diffuse Shading buffer – we want to be able to adjust these independently so it's helpful to render your scene twice – with shadows and without.



Specular Colour (Spec)

Shows the specular highlights in your scene. One of the great benefits of rendering out *.exr*'s is that the high dynamic range of these images allows you to bring out details in the image that may not be readily apparent. In the case of the specular pass, it allows us to increase or decrease the exposure of the image to make quite drastic changes to the specular values – very useful.



Alpha (A)

When is a pass not a pass? When it's a channel – an 'Alpha' channel to be precise. As a 3D artist, it's likely you've already encountered these – LightWave can output an alpha channel along with a normal render (or in the case of 32bit images embedded in the render). They're extremely useful for isolating elements in your render as we'll see later.



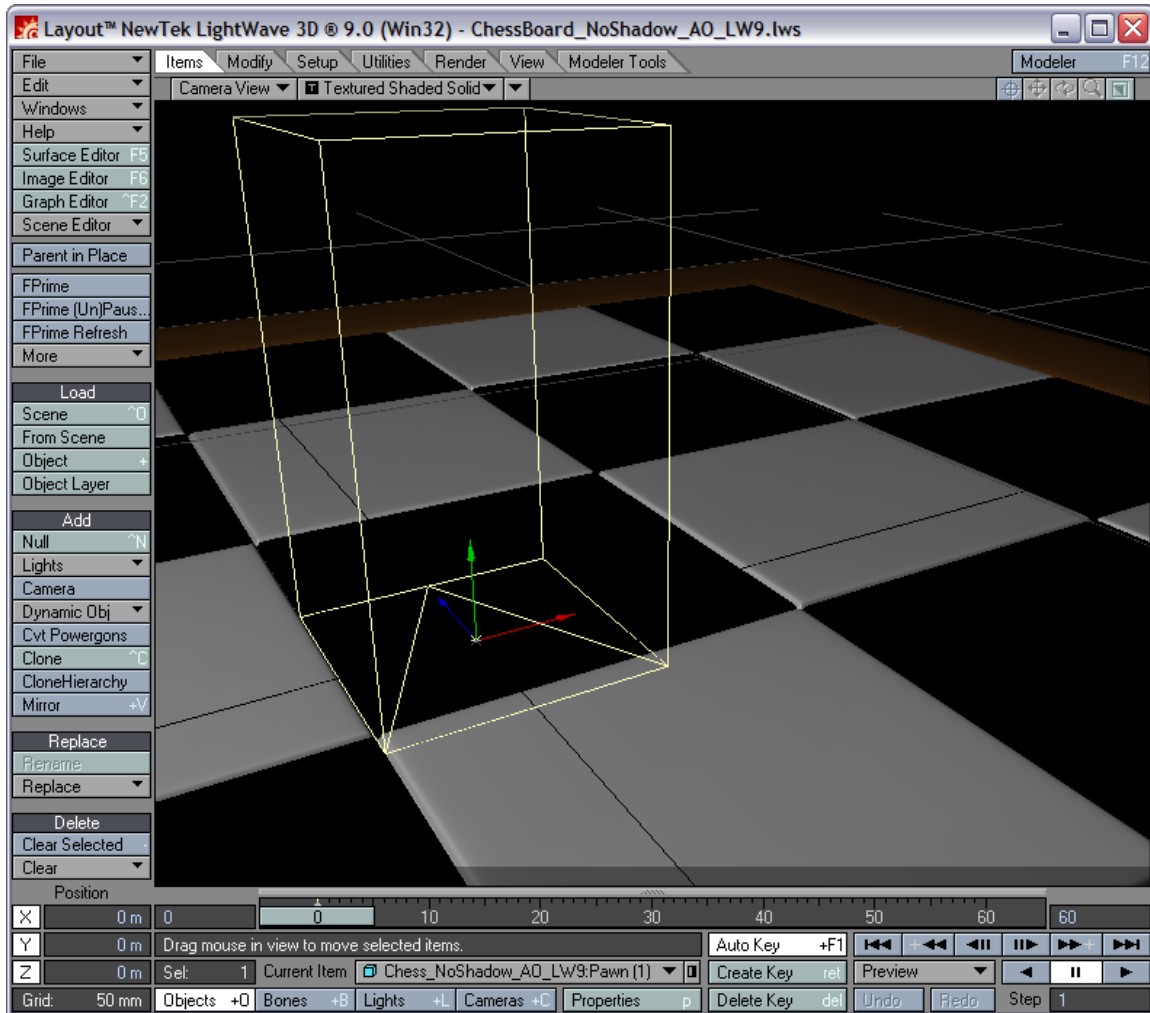
Depth (Z)

The Depth or 'Z Depth' pass is a greyscale representation of depth in your scene. The depth pass is handy for adding fog or depth-of-field effects in comp and some compositing packages can also use this information to position 2D elements in 3D space. The high dynamic range of *.exr* images is perfect for depth passes as it offers a far greater precision than 8bit greyscale images.

This briefly covers the passes we'll be using for this tutorial, for details on the full range of buffers *exrTrader* can output; please refer to the *exrTrader* manual.

Using exrTrader to render passes out of LightWave 3D

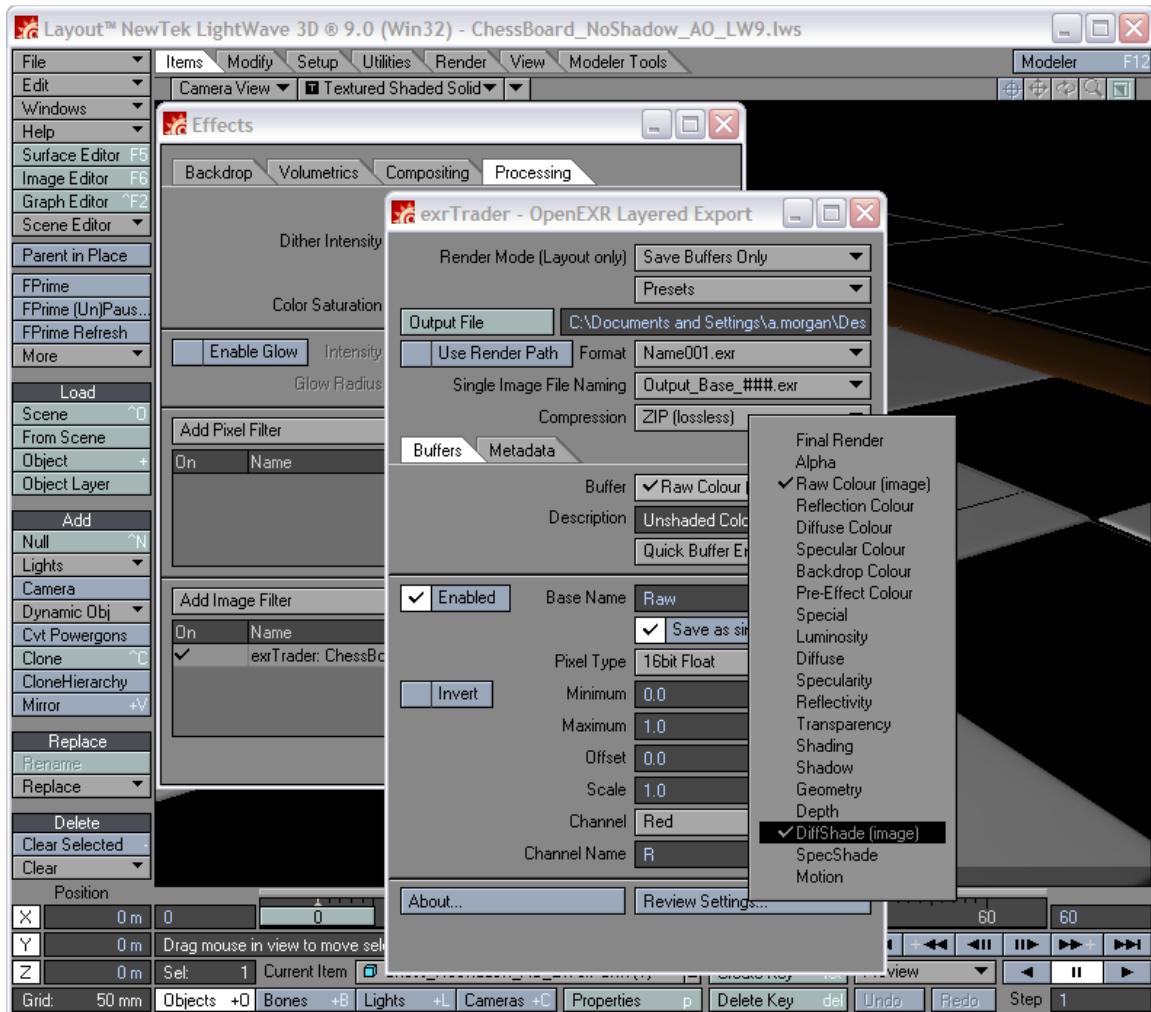
Now it's time to load up LightWave 3D 9 and put exrTrader to work – Load the 'ChessBoard_NoShadow_AO_LW9.lws' – the 'AO' stands for 'Ambient Occlusion' and if you examine the nodes in the surface editor you'll see that the Occlusion node is hooked up in the flow. With the scene loaded, you should see something similar to the image below:



ChessBoard_NoShadow_AO_LW9.lws

Let's talk a little about what's going on in this scene – it contains both the chessboard and the chesspiece objects although if you hit 'p' to get up the object properties whilst one of the pawns is selected you'll see that they're 'unseen by camera' and that the alpha channel is 'unaffected by object' – we just want the chessboard rendered here but we *do* want the pawn's effect on the ambient occlusion. Shadow casting is turned off in the render globals panel so the only diffuse shading we'll see is from the single area light and the ambient occlusion – ideally we'd render the AO separately but this setup works well enough for this tutorial.

Hit Ctrl+F8 to bring up the 'Effect/Processing' panel and select exrTrader from the 'Add Image Filter' drop-down. Double-click on exrTrader to bring up its interface – now we need to pick which channels to render – see the image below:



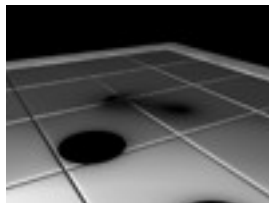
exrTrader with Raw Colour and Diffuse Shading buffers selected for output

Setting this up is pretty straightforward – change the 'Render Mode' to *Save Buffers Only*, specify your output path (I'm saving to the desktop), under buffers, deselect everything except 'Raw Colour' and 'DiffShade' and don't forget to set 'Save as single image' for both of them – Photoshop doesn't yet support .exr's with embedded layers. That's it – hit F9 and wait for LightWave to render the image – when it's finished you should find the passes you've selected saved in the location you specified.

Now load up *ChessPieces_NoShadow_AO_LW9.lws* and set it up the same way (but with different names for the output files). In this scene, the ChessBoard object is unseen by the camera and the alpha channel, with the ChessPieces visible – in all other respects it's the same as the scene you just rendered. When you're ready hit F9 and render it.



ChessBoard Raw



ChessBoard DiffShade

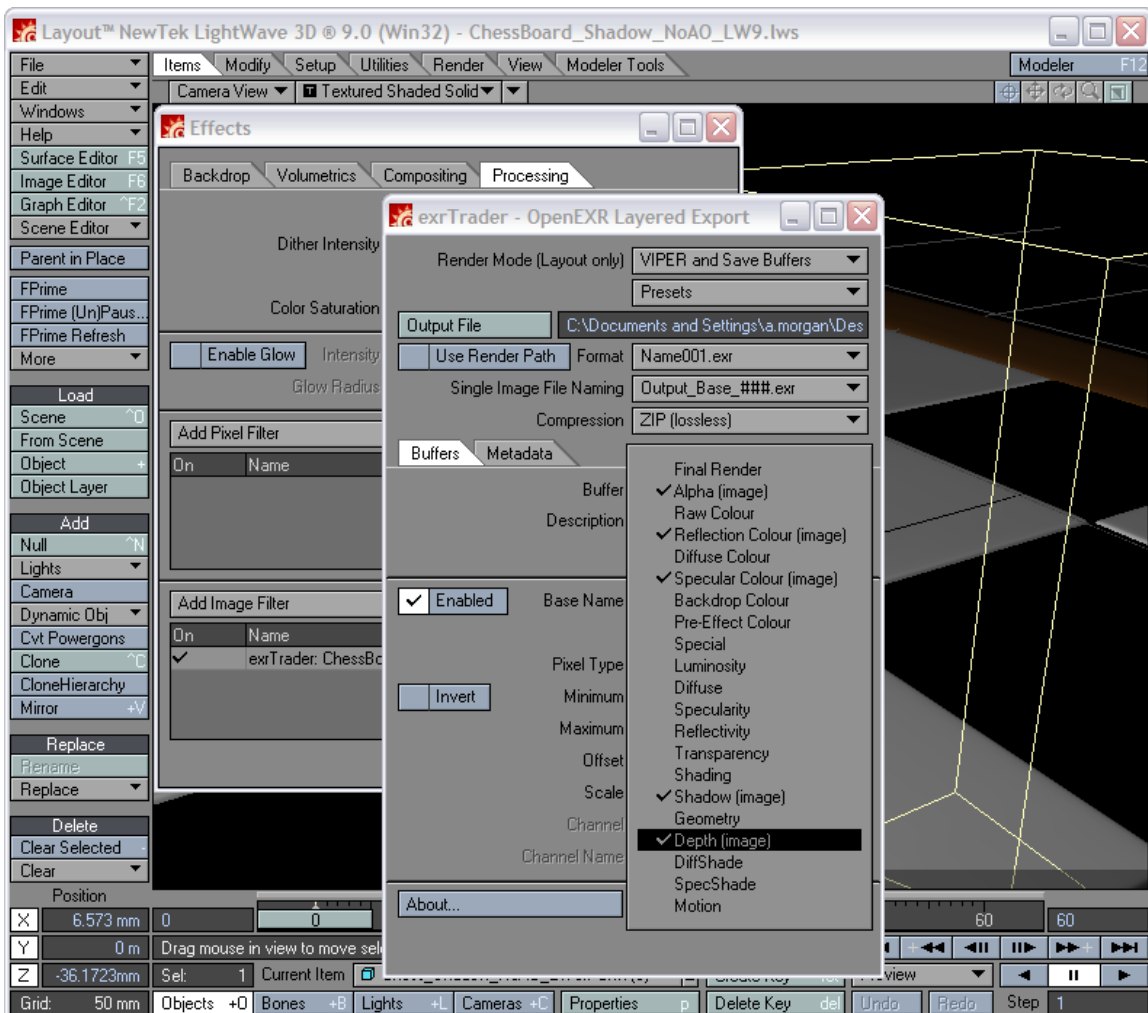


ChessPieces Raw



ChessPieces DiffShade

With this done you should now have four passes rendered – diffuse shading and raw colour for both the ChessBoard and the ChessPieces. Later on in Photoshop we'll combine these together to create our 'beauty' pass but before we do that we'll render out a few more passes using the other two scenes. Load up 'ChessBoard_Shadow_NoAO_LW9.lws' and hit Ctrl+F8 to bring up the 'Effects/Processing' panel again and add exrTrader – double click on it and set up the passes to render out as seen below:



ChessBoard_Shadow_NoAO_LW9.lws with exrTrader buffers selected

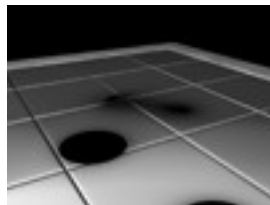
The 'Depth' buffer is a special case – the Z Depth buffer is a greyscale image that runs from black in the foreground to white in the background. As we want it to represent the Z depth of the objects in the scene in detail we need to set the range so it encompasses the objects we're interested in. You can leave the 'Minimum' value at 0.0m (which is the camera) and set the 'Maximum' to 0.216m which is the far corner of the ChessBoard Object.

So how do we know this? There's a few ways of working out the distance – the simplest way is just to eyeball it using the grid as a reference. The way I prefer to do it is a little more accurate – add a null and parent it to the camera (making sure 'parent in place' is switched *off*) then, with the null selected hit 'p' for properties and add the 'Range Finder' under 'Geometry/Add Custom Object' – if you now move the null along its Z axis you'll see it showing the exact distance from the camera. *exrTrader* also has the handy feature of being able to preview render buffers using VIPER - check out the *exrTrader* manual for more details.

Make sure *exrTrader* is set to save out single images and we're ready to render. When the render has finished load up *ChessPieces_Shadow_NoAO_LW9.lws* and set it up the same way - set the depth buffer to the same values (0.0m minimum 0.216m maximum) and give the buffers a new file name so we don't overwrite any previous passes we've rendered. When LightWave's done you should have a total of 14 passes as shown below:



ChessBoard Raw



ChessBoard DiffShade



ChessBoard Alpha



ChessBoard Refl



ChessBoard Spec



ChessBoard Shadow



ChessBoard Depth



ChessPieces Raw



ChessPieces DiffShade



ChessPieces Alpha



ChessPieces Refl



ChessPieces Spec



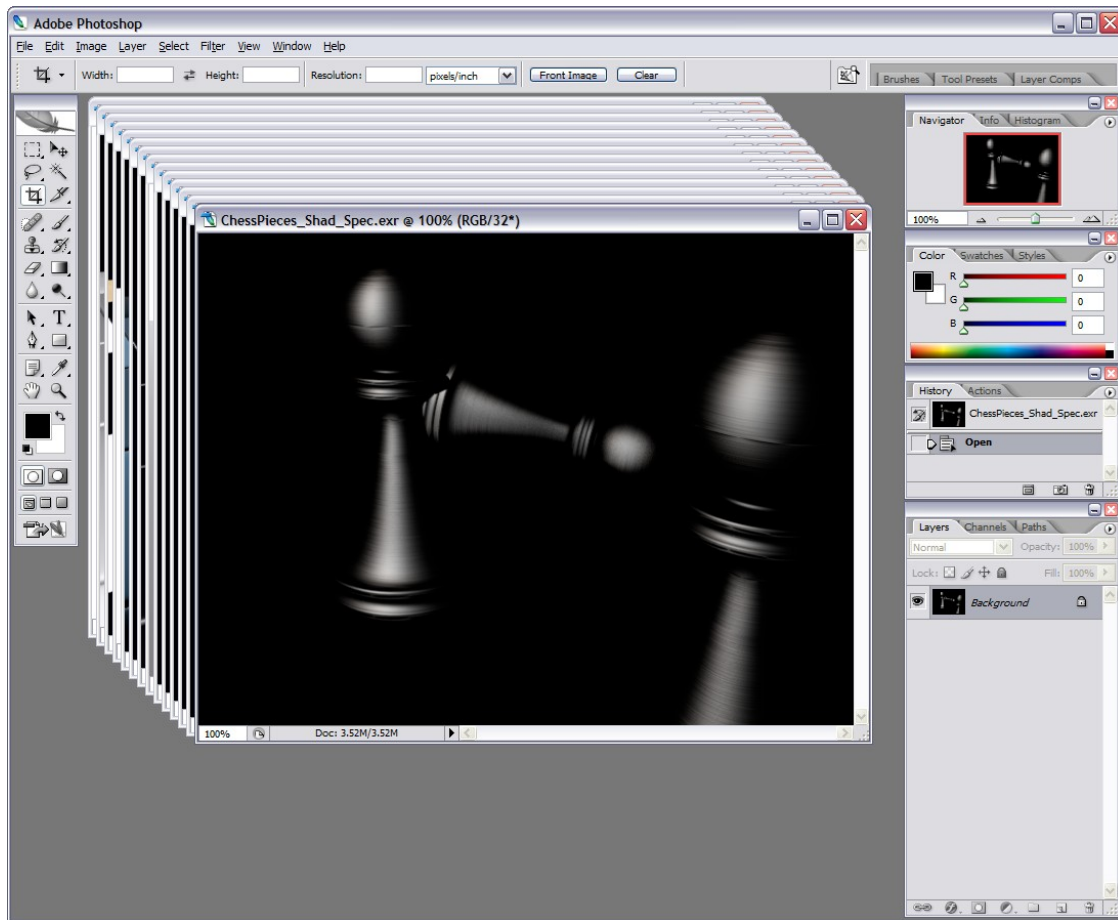
ChessPieces Shadow



ChessPieces Depth

Now let's take these into Photoshop and start compositing...

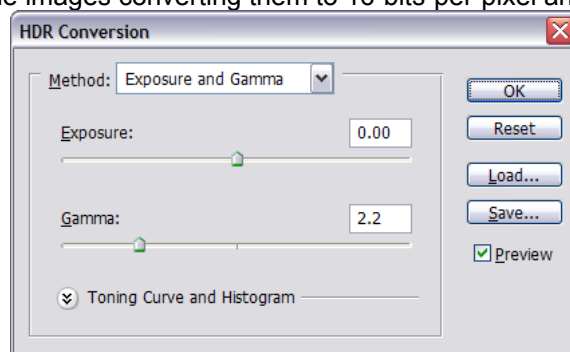
Putting it all together in Photoshop



Photoshop CS2 with all the .exr passes loaded

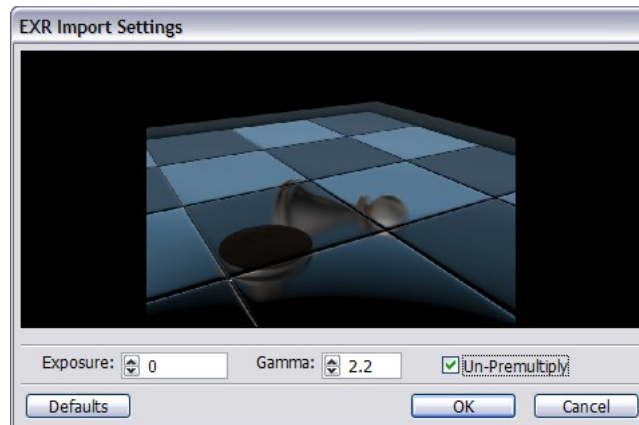
Above we can see a screengrab of Photoshop CS2 with all the .exr images loaded (shift-select them to bring them all in at once). Note that in the image title bar it says (RGB/32*) – this shows that PS has brought the images in as 32-bits-per-pixel – unfortunately Photoshop can't actually *do* much with them in this format so we need to convert them to 16-bits-per-pixel and adjust the gamma as we do - CS2 incorrectly interprets .exr images and boosts the gamma by 2.2

Pick an image (the spec one shown above is a good place to start) and select '*Image/Mode/16 Bits/Channel*' this will pop up the panel shown below. Set the gamma to 2.2 and click 'OK' – now go through the rest of the images converting them to 16-bits-per-pixel and correcting the gamma.



HDR Conversion panel in Photoshop CS2

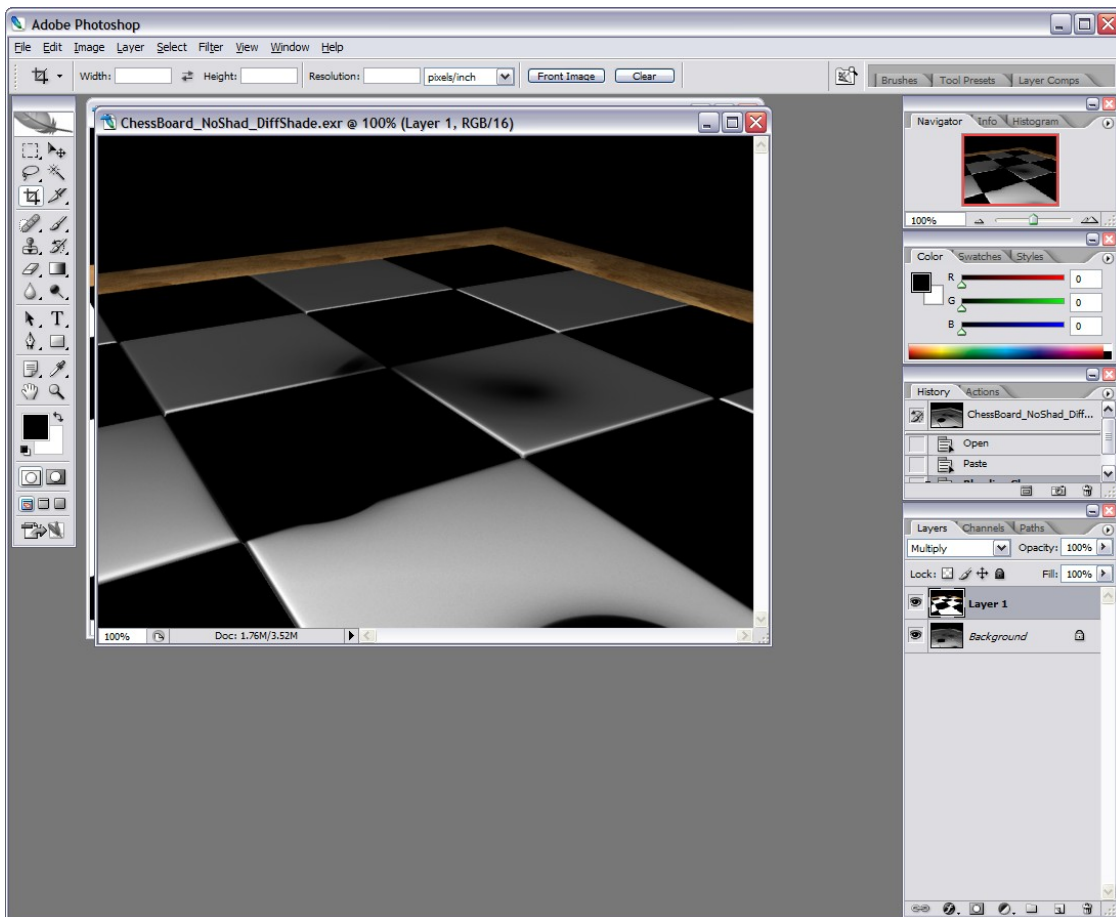
Note if you're using an older version of Photoshop with the ILM OpenEXR plugin, you'll get the panel shown below when you load an EXR image:



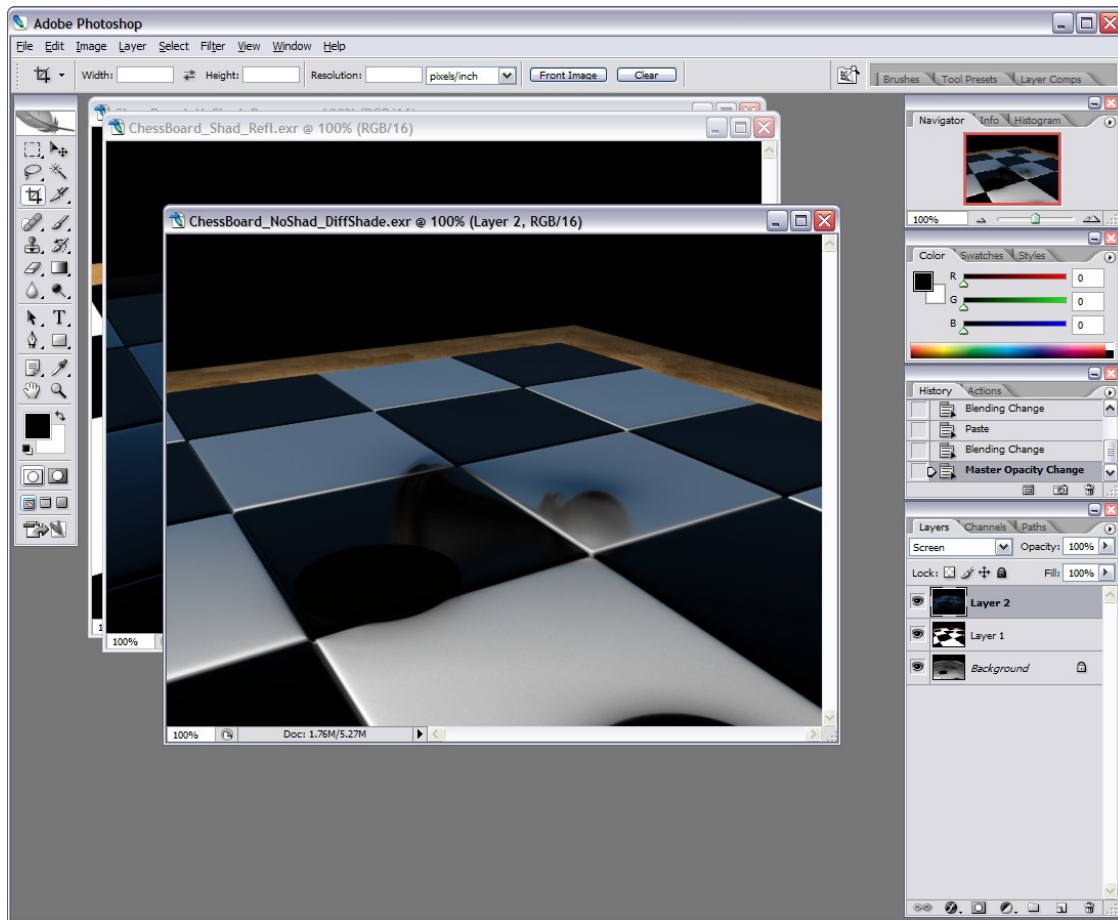
ILM OpenEXR Photoshop plugin

As you can see, the gamma is automatically set to 2.2 on import – *set this to zero* and the image will come in at the correct gamma at 16-bits-per-pixel. Even if you're using Photoshop CS2, you might want to use this plugin as it's a little more convenient than downsampling the images.

With all your images converted, select the 'Raw Colour' image for the ChessBoard and hit Ctrl+A to select all. Next hit Ctrl+C to copy it then select the 'Diffuse Shading' image for the Chessboard. Hit Ctrl+V to paste a new layer and change the blending mode from 'Normal' to 'Multiply'



The *multiply* mode combines the two passes together to create what's commonly known as a 'beauty' pass. Let's add another layer – select the 'Refl' image for the ChessBoard and hit Ctrl+A to select all then Ctrl+C to copy it – now click on 'Layer 1' in our comp and hit Ctrl+V to paste a new layer – this time select 'Screen' as the blending mode – your comp should look like this:



Combined DiffShade, Raw and Refl passes

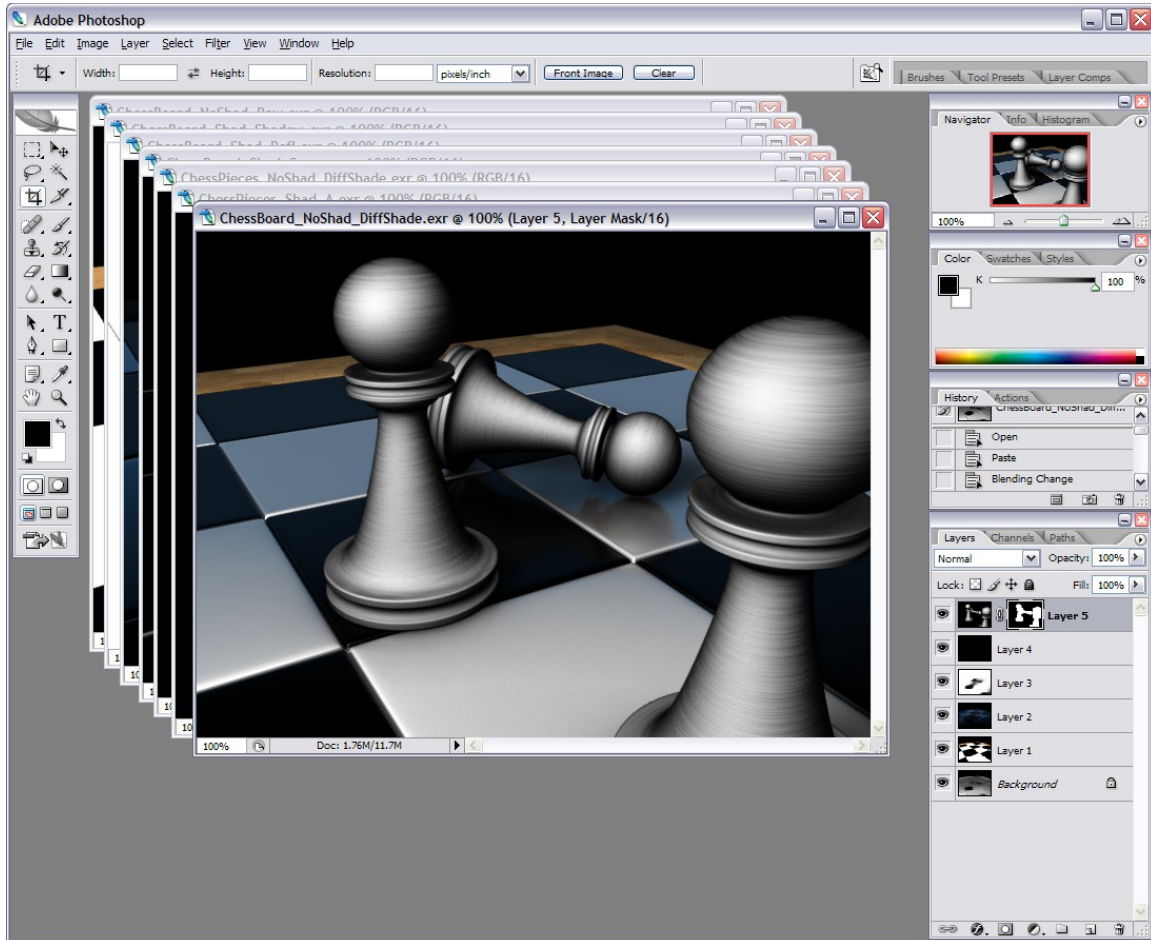
If you drag Layer 2's opacity slider down – say to around 50% - you can see how simple it now is to reduce the reflections on the chessboard – this is the kind of flexibility that makes rendering in passes and layers so convenient. Now select the 'Shadow' pass and hit Ctrl+I to invert it – then follow the same procedure – copying and pasting it down as a new layer.

Set the blending mode to 'Multiply' and then adjust the opacity to around 75% to lighten the shadows a bit – if you like, you can also apply a Gaussian Blur (5 pixels works well) to soften the shadows a little. To finish off the chessboard, copy and paste the 'Spec' pass to make Layer 4 and set the blending to 'Linear Dodge' (a discussion of the various blending modes is outside the scope of this tutorial but it's worth getting to know how they work – check out the Photoshop manual or help for more details).

This completes the chessboard comp but to illustrate the benefit of working with EXR images, select 'Image/Adjustments/Exposure' from the Photoshop menu bar and play around with the 'exposure' value – note that you can bring up the specular highlights even where there weren't any visible before – the dynamic range of OpenEXR's contain much more detail than the 8bits-per-pixel images you may have previously worked with.

With the chessboard finished, select the DiffShade image for the 'ChessPieces' – as before, copy and paste the image into your comp – this should be Layer 5 – leave the blending mode on 'Normal'. Now the chess pieces obscure the chessboard underneath – we'll need to create a 'layer mask' so select the alpha (A) image for the chess pieces with Ctrl+A and copy it with Ctrl+C.

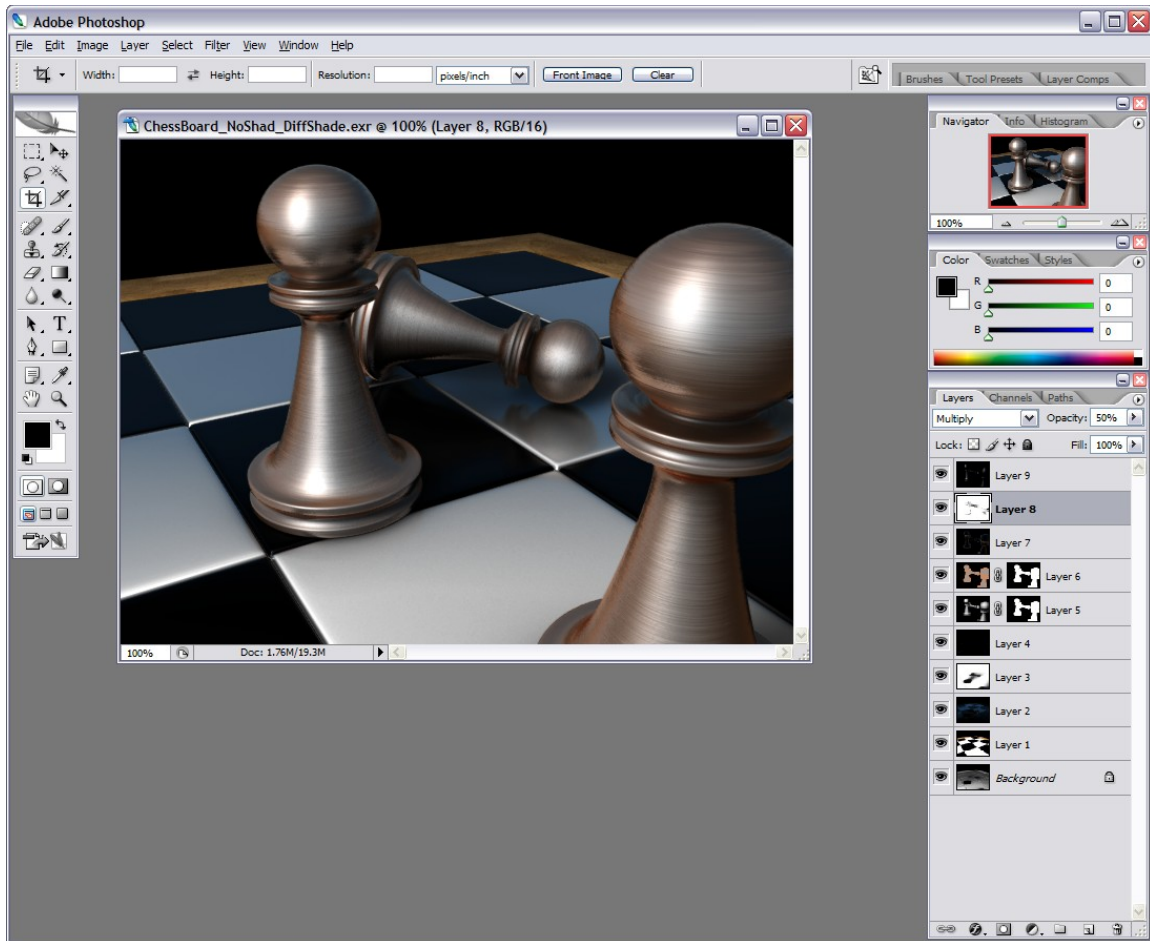
In the layers panel, click on the 'channels' tab and then on the 'Alpha 1' channel – hit Ctrl+V to paste our chess pieces alpha into the Alpha 1 channel then hold down Ctrl and left-click on the Alpha 1 thumbnail – you should see an outlined selection in the project window. Go back to the 'Layers' tab and (making sure Layer 5 is selected) click on the 'Add Layer Mask' icon at the bottom of the layers panel. You should now have something looking like this:



Completed ChessBoard comp with layer mask applied to ChessPieces DiffShade pass

Next up is the Raw Colour pass – as before, copy and paste the image into your comp. When you set the blending mode to 'Multiply' you'll lose the chessboard again – go back to the channel tab, Ctrl-left click on the 'Alpha 1' thumbnail to make a selection then switch back to the layers tab and apply a layer mask.

From here on in, it's much the same as assembling the chessboard – add the Refl, Shadow and Spec passes in that order to give you a total of nine layers (plus the *Background* layer). This time though, instead of blending the Refl pass using 'Screen' try using 'Linear Dodge' instead – in this instance it gets better results. Don't forget to invert the shadow pass using Ctrl+I. In the image below I've also reduced the chess pieces shadow pass opacity to 50% to brighten them up a little:



Finished Photoshop comp

If you haven't done so already – make sure you save your finished PSD. Now we've reassembled the render in Photoshop, feel free to play around with it – adjusting exposure, changing the opacity of layers, applying filters – you can create all manner of interesting effects which would be difficult or impossible to achieve with a single rendered image.

Let's finish up by adding a little depth-of-field to the image – select the Depth (Z) pass for the chessboard and Ctrl+A to select all followed by Ctrl+C to copy it – in the comp, switch back to the channels tab and make a new alpha layer using the 'turning page' icon at the bottom of the layers panel. Ctrl+V to paste the depth pass into 'Alpha 2'

Now switch back to the layers tab and shift-select the *Background* and Layers 1 to 4 – right-click and select 'Merge Layers' – all the chessboard layers will now collapse into a single layer. Go to the Photoshop menu and pick 'Filter/Blur/Lens Blur' – in the Lens Blur interface, change the 'Depth Map/Source:' to 'Alpha 2' and adjust the 'Blur Radius' to about 15. Lastly, click on the image around the point where the shadow of the pawn furthest away from the camera sits. Click 'OK' to apply the filter.



Finished comp with 'Lens Blur' depth-of-field applied