Optimizing Render Times with Radiosity and Volumetric Lighting

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The following tutorial is one way I have found to decrease the time it takes to render a high polygonal count scene that incorporates radiosity as its lighting solution and volumetrics. This is done by rendering the scene more than once but in different ways. The renders are then composited together giving great results as well as a little bit more control in the overall image.

Figure 1 below shows exactly how high polygonal count is and some of the technical scene details. Just by having that many faces one can see how rendering the entire scene in one pass would not be practical.

![Statistics for City_Streams_1.lws](image)

The picture to the right (Figure 2) is the OpenGL preview of the scene from the camera's perspective that is going to be rendered.
Lighting the Scene

The city is lit in two different ways. There is only one light in the scene and it is going to play the role of the sun and volumetrics. The other “light” is the environmental light that comes from the background and radiosity effects.

The image to the right (Figure 3) shows the distant light that's our primary light source. Below (Figure 4) is its rotation settings.

![Figure 3]

Figure 3

Once the distant light is set, we will modify its properties. Figures 5 - 6 show the Light Properties and the Volumetric Options for the light itself.

![Figure 5]

Figure 5

![Figure 6]

Figure 6
The next light we are going to add is the environment light through radiosity. This light is generated from the textured environment backdrop. Since we are going to be using FPrime to render everything in the scene other than the volumetric lighting make sure that FPrime’s rendering option is set to Monte Carlo Radiosity as seen in **Figure 7** below.

![Monte Carlo Radiosity](image)

**Figure 7**

Now we are ready to render the scene. Pull up FPrime’s render dialog box (**Figure 8**) and set the setting to stop at level 9. This is how high quality of a render is going to be made. For this scene, a setting of 9 yeilds acceptable results. **Figure 9** shows the completed render.

![Render Dialog Box](image)

**Figure 8**

![Completed Render](image)

**Figure 9**
Now that we have our image, it's time to render the volumetric lighting. The first thing to do is make all of the visible objects into Matte Objects as shown in Figure 10 to the left.

The next thing to do is to turn off the backdrop so that the background is pure black. Also, turn off any distance fog that you have in the scene. These panels are in Figure 11 - 12 below.

Now with these settings ready it's time to render. Hit F9 and let lightwave render the scene. The resulting image can be seen on the following page in Figure 13.
Ok, now that we have both of our images, its time to open up After Effects to composite them both. In Figure 14 below you can see how the two layers are arranged.

Now we are going to set the blending mode of the light layer so that it is screened over the city layer.
In Figure 15 you can see how exactly the Light layer should be screened in After Effects. I chose the screen option because choosing the Screen option multiplies the inverse brightness values of the colors in all layers. The resulting color is never darker than the original. Using the Screen option is similar to the traditional technique of superimposing two different film negatives and printing the result.

Figure 15

In Figure 16 above is all the effects I applied to the Light layer. Another advantage to compositing these renders together in this way is all of the possible effects you could do to either of the layers without having to re-render.

Figure 16
Below in **Figure 16** is the final composite. Now that you have both layers its always great to experiment to see all the different styles can be made by changing effects properties in After Effects instead of having to render the whole scene again. Good Luck!