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Tutorials

## Radiosity



2001 01 09

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id122



*The final result*

### Introduction

There has been a lot of buzz recently in the channels about a technique called Global Illumination. In my first tutorial, I hope to explain this technique a little better and give you a good starting point from which to try your own GI project.

Traditional still scene rendering usually involves lamps, spots, etc. But GI is a radiosity technique that allows you to light a scene from 360 degrees without a single lamp. This gives your scene more of a stylistic look.

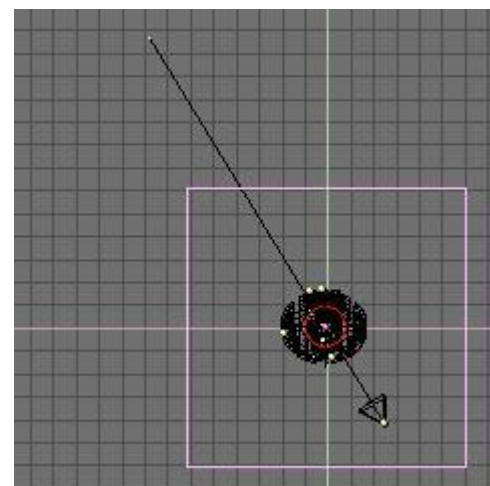
This image is an example of what can be done with Global Illumination. This tutorial will teach you how to work with radiosity and how to apply textures after the radiosity process is finished. I assume that you are already familiar with creating meshes, applying materials, and have a general understanding of the Blender interface. While you can certainly use your own scene for this tutorial, I have provided my Raider mesh below as a starting point.

 Download:  [GI.zip](#)

### Setting up the Scene

In the .blend file provided, you will notice that there are only two elements in the scene: a Cylon Raider and a camera. The Raider has the default grey material, except for the main cockpit windows which are black. For this technique, we will not need any lamps.

The first thing that we will want to add to the scene is a plane. This plane will be used as the floor in our scene. Resize the plane as shown on the right and place it just under the Raider. Leave a little space between the plane and the Raider bottom. This will give us a nice "floating" look.



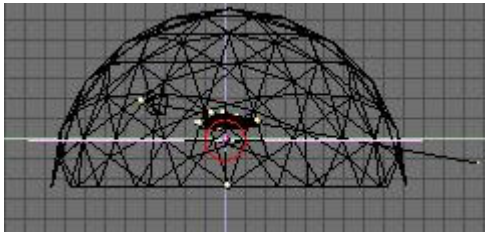
*Add a plane*

Next, you will want to give the plane a material and select a color for it. In my images I try to use a nice blue. You can use the setting on the right for this.



### The Dome

The next thing that we are going to add is an icosphere. This sphere is going to be our light source instead of the typical lamps. What we are going to do is use the vertices as



The dome

"emitters" that will project light for us in multiple directions instead of in one direction as with a typical lamp. This will give us the desired effect.

To set this up, add an icosphere with a subdivision of 3. While still in EditMode, use the **B** key to select the lower portion of the sphere and delete it. This will leave us with our dome. Resize the dome to better fit the scene and match it up with your plane. It should resemble the image to the right.

Next, we want to make sure that we have all the vertices of the dome selected and then click on the EditButtons **F9** and select <DRAW NORMALS>. This allows us to see in which direction the vertices are "emitting". Then select <FLIP NORMALS>, which will change the vertex emitter from projecting outward to projecting inward in our dome.



### The Dome Material

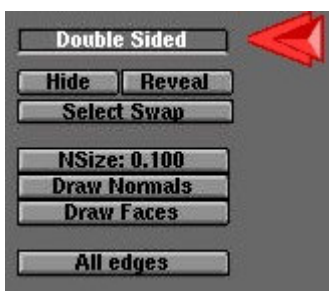
Now that we have created our dome, we need a new material. When you create the material for the dome change the following settings in the MaterialButtons **F9**:

Add - 0.000  
Ref - 1.000  
Alpha - 1.000  
Emit - 0.020



Material settings for the dome

The Emit slider here is the key. This setting controls the amount of light "emitted" from our dome. I generally use 0.020 but you can experiment with this setting to get different results. The lower the setting here though the longer the "solve" time later.

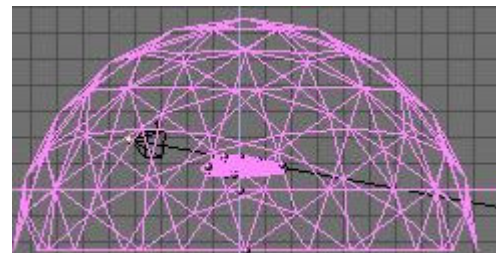


### Converting Meshes

At this point we have created everything that we need for our scene. The next step will be to alter the dome and the plane from "double-sided" to "single-sided". To achieve this, we will select the dome mesh and then go back to the EditButtons **F9**. Click the <Double Sided> button and turn it off. Repeat this process for the Plane.

### Collecting Meshes

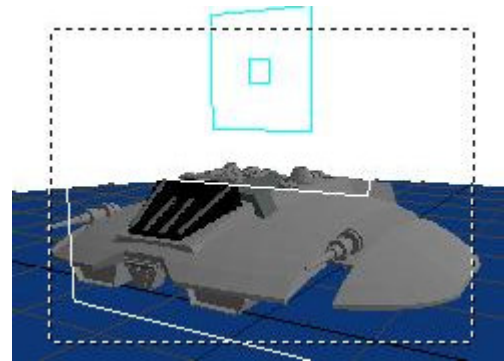
Now the next few steps are the heart and soul of Global Illumination. Go to side view with NumPad **3** and use the **B** key select all of the meshes in our scene. Next hold **Shift** and double click on your camera. We do not want this selected. It should look similar to the image to the right.



Select all the meshes

After selecting the meshes, go to camera view with **NumPad 0** and then turn on shaded mode with **Z** so we can see inside our dome.

Now select the RadiosityButtons **F9**. On the left-hand side of the menu, click the "collect meshes" button. You should notice a change in your view in the colors. It should look similar to the image to the right.

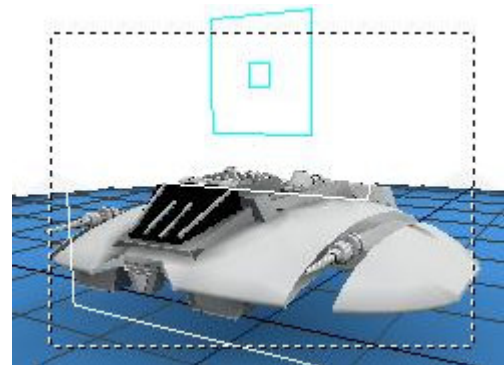


The RadiosityButtons

Next, to keep the Raider smooth like our original mesh, we will want to change from "Solid" to "Gour" (#1). This will give our Raider its nice curves back, in the same way "Set Smooth" would in the EditButtons **F9**. You'll also need to change the "Max Subdiv Shoot" to 1 (#2). Do not forget this step.

### "Solving" the Meshes

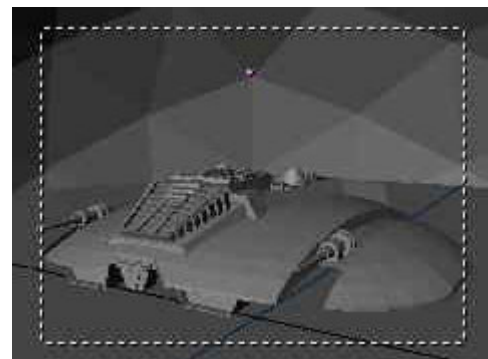
After you have set "Gour" and "Max Subdiv Shoot", click "Go" and wait. Blender will then begin calculating the emit part of the dome, going face by face, thus "solving" the render. As it does this, you will see the scene change as more and more light is added to the scene and the meshes are changed. You will also notice that the cursor in Blender changes to a counter much like if it were an animation. Let Blender run, solving the radiosity problem.



I usually let Blender go to somewhere between 50-500 depending on the scene. The solving time depends on you and how long you decide to let it run...you can hit **Esc** at any time to stop the "solve." This is an area that can be experimented with for different results. This can take from 5 to 10 minutes and your system speed will also greatly determine how long this process takes. The picture above is our Raider after 100.

After hitting the **Esc** key and stopping the "solve," click "Replace Meshes" and then "Free Radio Data." This finalizes our solve and replaces our previous scene with the new solved radiosity scene. It should look like this...

Now we are ready for **F12** and render...and viola!



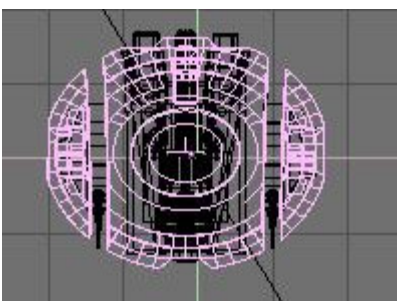
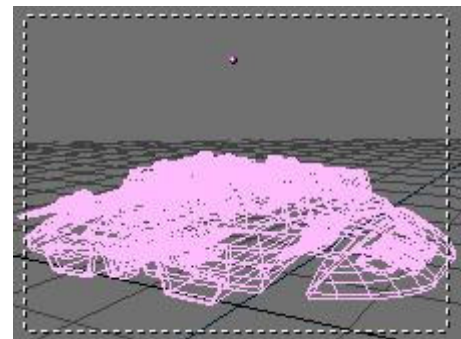


### Moving on to Textures

There you go folks! You now have a very clean looking render with soft 360 degree lighting using radiosity. Very nice... But the next thing we want to do is add textures to the mesh. So hit **ESC** to exit the render and go back to our main screen area.

Now try selecting your mesh and you will notice that it selects not only the Raider but the plane and dome as well. That is because we created a new mesh through the radiosity solve. To add a texture though, we only want the Raider.

So, select the mesh and then go into EditMode. In EditMode we can delete the dome and plane since they are no longer needed. You can use the **B** key to select the proper vertices and press **X** to delete them. Keep selecting and deleting until you are left with only the Raider. It should look like the screenshot. If we were to render it now with **F12**, we would get just a black background and our Raider. This is nice.. but again, we want textures!



*Separate parts with 'p'*

### Splitting the Mesh

To add textures to mesh, we must separate out the areas that we are going to apply materials and textures to. For the Raider, I wanted to add textures to the wings and mid-section. To do this select the Raider mesh, and go back into EditMode. Select a vertex near the edge of the wing and then hit the **L** key to select linked vertices. Do the same on the other side. Next, click on the mid section of the ship and do the same thing. Select the areas shown in the figure. When you have those, hit the **P** key to separate the vertices selected.

### Adding the Material

We now have our wing section separate and are ready to add the



materials and textures. You will want to create a new material for this mesh. To get a nice metallic look, I have used the settings you see in the figure.


Time to add the textures. There are four textures for the Raider wings and these textures can be downloaded below. The next step is adding them to the material.

Download:  [textures.zip](#)




A metallic material

## Adding the Textures


To add the textures go to the TextureButtons , select new texture and then click on the image button and load the texture. You will need to do this with each of the textures, assigning them to the same material. You should have the following textures (see figure).



Negative NOR and REF setting


The textures should be set up as follows in the MaterialButtons : RaiderBM.JPG and RaiderDL.jpg should be set to a negative NOR (click NOR twice, it will turn yellow). Raider.JPG should be set up as negative REF.



The result is the desired metallic plating for the hull of the Raider. Finally, markings3.jpg is set to COL in the MaterialButton . This will give the Raider its proper striping and insignia. The material preview for the mesh should look like the image.

## Light the Scene and Render



For our textures to show up in our rendering, we will now need to add a lamp or two, keep in mind that our ship is still lit pretty well from the radiosity solve so tone down your lamps energy. Once you have your lamps, you try a test render with . Experiment with the lamps until you get the best results.

Here is the final rendering... A nice well lit Raider with soft texturing. If you would like a copy of the final blend, you can get it below.

I hope you have had fun with this tutorial and will enjoy this new way of using Blender and radiosity!

Download:  [GI\\_final.zip](#)

## Feedback



WileCoyote

2001 01 09



xlent!!! Thanks for the visual aids! and the textures. . .



vogelap

2001 01 09



I especially like the little arrows indicating steps in the screenshots. VERY handy, especially when the

item is printed!



Mad-Sci

2001 01 09



Great job Cujo, it took a while to get out there, but it was well worth the wait.

Extremely helpful information, finally there is a good tutorial for this method of global illumination. I am sure you will help a lot of people with this. Keep up the great work!

-Dereck G.



MatrixNAN

2001 01 09



I love it great idea!

Nate Nesler



Kib\_Tph

2001 01 09



very nice Cujo31



Pol

2001 01 09



Such a cool tut !!!!!



gdi12

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This is very cool! It reakky help me a lot!