

# The Node Editor

This addendum covers the Material nodes in the LightWave Node Editor in depth. With the help of these nodes, you can replicate advanced physically accurate materials such as glass, metal, wax, plastic, skin, and many more. The companion files included with this addendum contain sample scenes with different lighting setups for users to learn from and take apart, along with the material presets used in the creation of the images in this section.

### Materials Expanded

Since the release of LightWave v9.2, the Material nodes have become extremely popular and rightfully so — they are incredible! These Material nodes can help you simulate physically accurate materials to achieve a greater level of realism in your renders. Most Material nodes are energy-conserving materials with the exception of Switch and Material Mixer. These are really utility nodes that work specifically with materials, which is the reason they are in this section. “Energy-conserving” means that the Diffuse and Specularity (Reflection) properties of the material will always equal 1; for example, if you set Specularity to 40%, then the Diffuse value would be 60%.

With the release of version 9.3, NewTek has added a feature to LightWave that makes the use of materials even easier: Volume Stacking. This feature makes air polygons and even the Switch node technique to add different IOR (Index of Refraction) for different surfaces a thing of the past. With Volume Stacking, a single-sided surface will behave like a solid mass (similar to a crystal ball), while a double-sided surface will behave like a thin layer with air inside (similar to a bubble). Volume Stacking will work on every instance where different refraction indices are needed, like SSS nodes, and not just on materials. This streamlines the process of creating surfaces such as glass, water, milk, skin, etc.

**NOTE:** Volume Stacking doesn’t have an on/off switch; it is always on.

Before we begin exploring these nodes in more depth, I want to remind you that since these materials are physically accurate you can expect longer render times; that is often the case with anything that is physically accurate. Having said that, the longer render times can be very well worth the wait! Also, I will be setting up the examples with LightWave v9.3 to take advantage of the Volume Stacking feature and make our lives a little easier while setting up node networks; this way you can concentrate on the actual Material node and not on whether or not you need a Switch network.

It is recommended that you make similar type connections to the destination node for more predictable results. Material nodes can be considered a bit advanced, but don't let that stop you. Experiment — that's part of the fun!

Conductor

This node is used to simulate physically accurate metals. Materials that can transfer electricity, heat, or both are conductors; metals are excellent conductors. The Conductor node is one of the easiest nodes to understand since it has just a few options to experiment with. Since it doesn't deal with any kind of translucency, it is one of the quickest materials when it comes to rendering. This node can receive data from other nodes in the network or by manually inputting values via the node's Edit panel.

Basic Tab

**Color** — This is the overall color of your metallic surface. You can create anything from chrome to rusted old metal sheets by creating a node network and connecting it to this input.

**Specularity** — This input is really “Reflectivity” since it controls how reflective the surface is. In the “classic” Surface Editor, Specularity controls how bright and how wide the specular highlight is, but here, since this is a physically accurate material, Specularity and Reflection are the same thing. A specular highlight is the result of a reflected light source on the surface.

Keep in mind that since this is a metal material, the reflections will be tinted with whatever is in the Color input. In real life, metal reflects wavelengths in a different fashion than other materials, which results in tinted reflections.

**Roughness** — This works in tandem with Reflection Blur in the Advanced tab of the node's Edit panel. Roughness controls how blurry the reflection is; the higher the percentage, the blurrier the reflection will be. Make sure that you activate Reflection Blur in the Advanced tab of the node.

**Bump Height** — You can create any kind of bump node network and connect it to this input in the Conductor node, and then you can fine-tune the bump amplitude by changing the Bump Height percentage amount in the

Conductor node's Edit panel. I usually add some sort of bump to all of my metals even if they are meant to be smooth; this breaks up the reflection and mimics subtle imperfections on the surface.

**Receive Radiosity** and **Receive Caustics** toggles — These are kind of self explanatory, right? These options are useful because you can tell LightWave which surfaces have to be calculated in the Radiosity and Caustics solution. These repeat on almost every node so I won't be redundant and say the same thing over and over again. There are many more interesting things still ahead...

**Advanced Tab**

**Reflection Blur** — This option toggles blurry reflections on the surface. For blurry reflections to be seen, the Roughness option in the Basic tab needs to be set to anything other than 0%.

The rest of the options in this tab resemble the options in the Environment tab of the Surface Editor. Here you can select the Reflection mode you wish to use in that particular material, just like in the Surface Editor's Environment tab. You can select the image to be reflected if the mode requires one and you can set the number of samples for the Reflection Blur; the higher the number (up to 15), the cleaner the blurry reflection will be. Keep in mind that Reflection Blur will increase your render times, so use this with caution.

The following images show different setups of the Conductor node in order to achieve different looks. Figure 14a-1 shows a chrome material and a variation created by simply changing the Conductor node's Color value to the original chrome material. Figure 14a-2 demonstrates blurry reflections in action and the results of increasing the Roughness value. As I have said before, always experiment to see the different looks you can come up with.



Figure 14a-1: Chrome using the Conductor node



Figure 14a-2: Different Roughness values

Delta

Delta is also an energy-conserving material, which simply means that the sum of Specularity and Diffuse will always equal 1, as described earlier. For example, if you change the node’s Specularity value to 40%, then Diffuse will equal 60%. If the Specularity value is 100%, the Diffuse value will be 0%. So, what exactly does this material do? Well, Delta is a general-purpose material; it’s like the “Swiss Army knife” of materials since you can create solid and transparent materials with it, sort of like the regular LightWave shading model. Now you might be asking yourself what the difference is between Delta and Dielectric. Dielectric was specifically designed for glass and liquids, and therefore it has some options that are lacking in Delta, like Absorption. We will cover Dielectric in a moment, but first let’s look at the different options found in the Delta material node.

Basic Tab

- Color** — This is the overall color of your metallic surface. You can create anything from chrome to rusted old metal sheets by creating a node network and connecting it to this input.
- Specularity** — This input is really “Reflectivity” since it controls how reflective the surface is. In the “classic” Surface Editor, Specularity controls how bright and how wide the specular highlight is, but here, since this is a physically accurate material, Specularity and Reflection are the same thing. A specular highlight is the result of a reflected light source on the surface.
- Roughness** — This works in tandem with Reflection Blur in the Advanced tab of the node’s Edit panel. Roughness controls how blurry the reflection is; the higher the percentage, the blurrier the reflection will be. Make sure that you activate Reflection Blur in the Advanced tab of the node.

**Transparency** — This controls the amount of light that is allowed to pass through the material. The higher the value, the more light passes through, and therefore the more transparent it is.

**Refraction Index** — This value determines how much refraction distortion results in the material. The higher the number, the higher the density of the material, and therefore the greater the distortion.

**Bump Height** — You can create any kind of bump node network and connect it to this input in the Delta node, and then you can fine-tune the bump amplitude by changing the Bump Height percentage amount in the Delta node's Edit panel.



Figure 14a-3: Solid and transparent Delta

Dielectric

This node physically simulates the characteristics of non-conductive materials. Dielectric is most commonly used for materials like glass and liquids. In dielectric materials, the Index of Refraction (IOR) changes according to the different materials that the rays travel through, such as air to glass to air or air to glass to liquid to air. These are just a couple of possible scenarios where this node might be useful. Dielectric uses Snell's law to calculate refraction angles and Beer's law to calculate absorption. It's important to note that for this node to work properly you are no longer required to turn Double Sided on or add the Switch and Spot Info nodes as in LightWave v9.2 due to the Volume Stacking feature added in v9.3. You can now directly plug this node into the Material input of the destination node and the material will automatically give different



Figure 14a-4: Dielectric glass

IOR to both sides of the polygons being evaluated. Don't forget to turn Raytracing on for reflections and refractions in the Render Globals panel.

If you apply this material with its default values to your object and then render, you will most likely get a completely transparent surface. This is normal; if you look closely at the node's options you will see that Refraction Index is set to 1, which is normally used for air. Change the IOR value so the light rays successfully bend when they penetrate the surface. Glass typically has an IOR of 1.5. Now, let's see how the options for this node contribute to the overall look of the shader.

**NOTE:** See Appendix C, "Refraction Index Chart," in *LightWave v9 Texturing* for the refraction indices of dozens of materials.

Basic Tab

**Color** — This is the color that the refractions will be tinted with as the material gets thicker. Color works closely with Absorption. You can manually enter a solid color or you can connect a node network to this input to create some interesting color effects.

**Absorption** — This option controls how much light the material absorbs; the more light that is absorbed by the material, the darker it will be. So, the higher the Absorption value, the thicker the appearance of the material. Figure 14a-5 shows a sample of Dielectric glass with quite a bit of absorption.



Figure 14a-5: Dielectric absorption

**Refraction Index** — This value, as you already know, determines how much refraction results in the material; the higher the number, the higher the density of the material, and therefore the greater the distortion.

**Roughness** — This works in tandem with Reflection Blur in the Advanced tab of the node's Edit panel. Roughness controls how blurry the reflection is; the higher the percentage, the blurrier the reflection will be, giving the surface a rougher appearance. Make sure that you activate Reflection Blur in the Advanced tab of the node.

**Bump Height** — As with the other materials, here you fine-tune the bump amplitude by changing the Bump Height percentage amount in the node's Edit panel. I usually add some sort of bump to all of my materials even if they are meant to be smooth; this breaks up the reflection and mimics subtle imperfections on the surface. Of course, it also depends on what you are

trying to achieve — you wouldn’t want to add a very strong bump to a glass sphere that’s supposed to be perfectly smoothed and polished, for example.

Advanced Tab

**Reflection Blur** — Basically, this is the same as with the other materials such as Conductor. This option toggles blurry reflections on the surface. For blurry reflections to be seen, the Roughness option in the Basic tab needs to be set to anything other than 0%.

**Refraction Dispersion** — We’ve probably all seen a prism at work during our early school days. The light enters the prism from one side and all of the colors of the rainbow come out on the other side. This is dispersion in action. Dispersion separates the light into its spectral components where each wavelength has a different IOR. Likewise, in a rainbow each drop of rain acts as a tiny prism. This option recreates this phenomenon, and the higher the value, the greater the amount of dispersion. Try it out for yourself.

The rest of the options in this tab are similar to the options in the Environment tab in the Surface Editor. Here you can select the Reflection mode you wish to use in that particular material, just like in the Surface Editor’s Environment tab. You can select the image to be reflected if the mode requires one, and you can set the number of samples for the Reflection Blur; the higher the number, the cleaner the blurry reflection will be. Remember that Reflection Blur will increase your render times.

Fast Skin

LightWave version 9.3 comes with two different materials for the creation of skin, arguably one of the most difficult materials to create convincingly in CG. This is due in part to its semi-translucent properties and the different layers of matter in the body such as blood, muscle, and bones. When light passes through the layers of skin, it scatters around off all of the different matter before it exits at a different angle, giving the material a soft diffuse shading and the appearance that it is being illuminated from within. This effect is known as subsurface scattering (SSS). Fast Skin and Simple Skin (covered later on) help us replicate the look of skin for our models. There are several SSS nodes to pick from in LightWave v9.3, but only these two combine two layers of SSS — a diffuse and a reflective layer in one single node — making it easier to control, fine-tune, and set up. So, what’s the difference between these two skin nodes? Well, the biggest difference, as the name implies, is that Fast Skin renders faster than Simple Skin. Another significant difference is that Fast Skin provides separate controls of Back-scatter percentage amount for both the epidermis and subdermis.



As with all transparent and semi-translucent materials in v9.3, thanks to Volume Stacking we do not need to set up a network to work out polygon sides; we can just connect the output of this node to the Material input of the destination node, and the renderer takes care of sorting the polygons. However, you need to remember to keep the Double Sided option off; otherwise, LightWave will think that your model is not a volume but a hollow model with air inside, as described earlier in this chapter.

Another thing to remember is to have a “watertight” object in order for the shader to work the way it was intended. This simply means that you should close all of the open edges that your object has so if it were to fill with water, none of the water would escape. In our case, we want to fill the object with light, which will scatter inside the object.

This shader works without radiosity, but having some sort of radiosity with at least two bounces will make a huge difference in the look of the skin. All of the examples included here have been rendered with radiosity with two bounces. Figure 14a-6 shows the huge difference having a Radiosity setup makes when using Fast Skin.

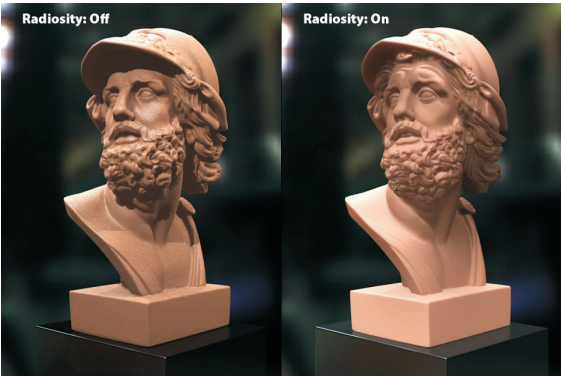


Figure 14a-6: Fast Skin with Radiosity

When creating a complex shader such as skin it is extremely important to see what each option is doing by itself to better understand what to fine-tune and by how much.

To do this effectively, turn all of the options’ values to 0% so they do not contribute to the look of the shader and then tweak to your heart’s content. Remember to take notes so when you find values you like you can use them later, since once a layer of the shader is tuned you will be turning it off so you can work on the next layer by itself. After you have all the layers set up how you want, then you can proceed to tune your surface with all of the layers on and make the final tweaks as necessary.



Creating a great skin shader can be time consuming, but this is a process that should not be rushed. The results will be well worth the effort.

When you first open the node's options, you will see that the options are broken down in sections, each of which represents a layer in the shader. This shader has one diffuse, one reflective, and two subsurface scattering layers. Let's take a look at these options and how they work with one another.

**Basic Tab**

**Diffuse Color** — This is the overall color of your surface and where you would connect a painted texture if you happen to need one. If you are going for realism, this texture is extremely important. Paint all of the details seen on skin, from beauty marks to scar tissue. Take your time painting this, as the look of the model will only be as good as your textures are.

**Diffuse** — You are probably familiar with Diffuse at this point; it is covered in detail in Chapter 4, "Surface Attributes." To recap, this option controls how much light is reflected and how much light is absorbed by the surface, so the higher the value, the brighter the surface. More often than not you will want this value to be low. In Figure 14a-7, you can see the difference between Diffuse values of 30 and 50; it might not sound like much but as the image shows, the difference is quite drastic.

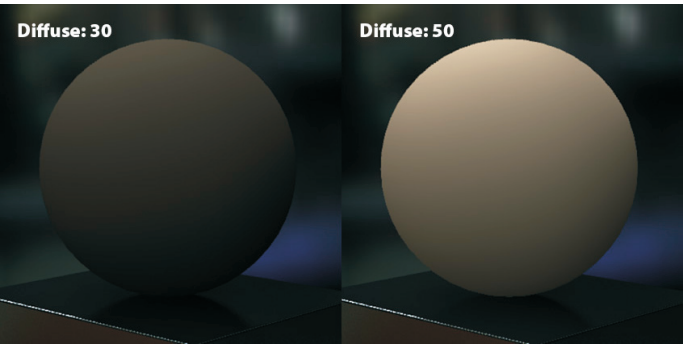


Figure 14a-7: The effects of Diffuse

**Respect Bump** — If you have a normal map from ZBrush, for example, connected to the Fast Skin node and you notice that it isn't as strong as it should be, then increase this value. It controls how strong the map will appear on the surface. It is also important to know that Fast Skin has inputs for normal maps and bump maps; you can have both on your network and create some interesting bump details.

**Specular Color** — You can specify a color for your specular reflections, or you can connect other nodes in the network.

**Specularity** — Again, as previously discussed, this is really “Reflectivity” since that’s what it actually controls. The higher the value, the more reflective the surface will be.

Figure 14a-8 shows Specularity at work at different intensities. As you can see, the higher the value, the more reflective the surface becomes. Also notice the noise in the image, which is caused by low sample levels for faster rendering.

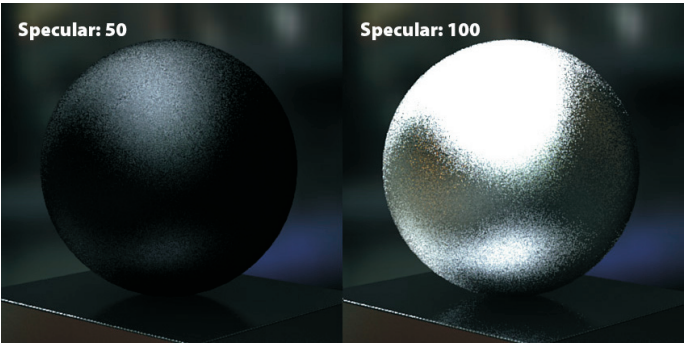


Figure 14a-8: The effects of Specularity

**Glossiness** — This works in conjunction with Specularity. A rough surface will have a wide specular reflection, while a wet and smooth surface will have a very tight specular reflection. The higher this value, the tighter the specular reflection will be.

Figure 14a-9 demonstrates the effect of Specularity and Glossiness working together; nothing else is active, thus making it easier to see the result of the values when testing and fine-tuning. In this particular example, Specularity was set to 15 and Glossiness to 50.

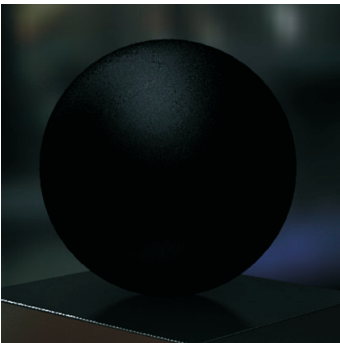


Figure 14a-9: Specularity and Glossiness

**Fresnel** — Named after the physicist Augustin Jean Fresnel, this is the phenomenon of the varying amount of reflectivity depending on the angle at

which the surface is viewed. The higher this value, the more reflective the surface is at glancing angles.

**Refraction Index** — This value, as you already know, determines how much refraction results in the material. The higher the number, the higher the density of the material, and therefore the greater the distortion.

**Epidermis Visibility** — The epidermis is the outer layer of skin, and this value controls how visible this layer is.

**Epidermis Backscatter** — This option controls the amount of backward light scattering for the outer layer of skin. This is associated with the Epidermis Visibility option above. Notice in Figure 14a-10 that the higher the value, the more illuminated from inside the surface appears to be.

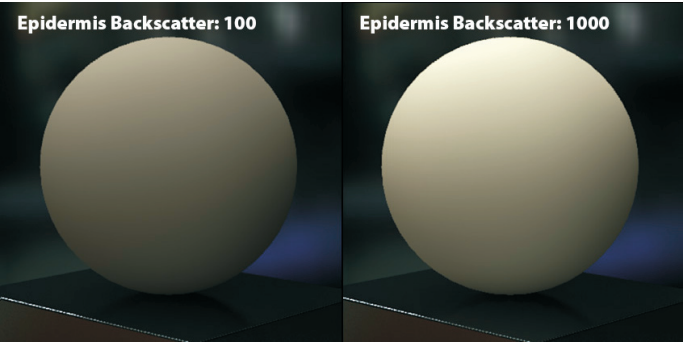


Figure 14a-10: Epidermis Backscatter

**Epidermis Color** — Here you can specify what color the outer layer of skin is by either entering a color manually or from other nodes in the network; keep in mind that this layer actually contains very little color. You can easily create a texture for this option that is derived from the diffuse texture. In your image editing program of choice, you can make the diffuse texture a lot more pale looking and not as saturated. This will give you a good base to start with, and most of the time that's all you have to do to get good results.

**Epidermis Distance** — This controls how far light travels through the outer layer of skin. Keep this value really low. 5mm should be enough in most cases, but as always it depends on your model and the look that you are after.

**Epidermis Gamma** — With this option, you can adjust brightness and contrast together in this particular layer.

**Subdermis Visibility** — The subdermis is also called the hypodermis, which is right below the dermis. For all intents and purposes, the dermis and subdermis are the same thing in this node. There really is no need to

treat these two separately since they both contribute to the fleshy feel of the skin. This value controls how visible the subdermis is.

**Subdermis Backscatter** — This option controls the amount of backward light scattering for the inner layer of skin and provides the “glowing ears” effect. This is associated with the Subdermis Visibility option above. In general, Subdermis Backscatter should have a larger value than Epidermis Backscatter.

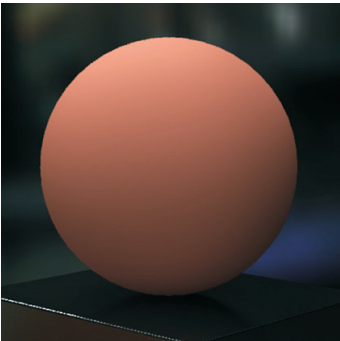


Figure 14a-11: Subdermis Backscatter

**Subdermis Color** — You can enter a color manually, but if you are going for realism you can create a dedicated texture. It is common for this texture or color to be a semi-saturated red of medium brightness to mimic the blood and muscle in the body; this is what gives you that nice soft reddish color in your surface.

**Subdermis Distance** — This controls how far light is absorbed into the inner layer of skin.

**Subdermis Gamma** — With this option, you can adjust brightness and contrast together in this particular layer.

**Quality** — Here you control how good the quality of the shader will be when rendered. The lower the value, the faster it will render but the more noise you will get in the final image.

**Bump Height** — With this parameter, you can control the amplitude (intensity) of the Bump input. This is useful since you can control the intensity of the bump effect without changing the network connected in the Bump input of the Fast Skin node. So for example, if you have a bump map painted in Photoshop or ZBrush and this texture is connected directly to the Bump input, you can increase the Bump Height value to increase or decrease the bump effect.

**Advanced Tab**

**Reflection Blur** — Guess what this one does... yep, it blurs the reflection. By now you should be familiar with this parameter since we have talked about it in several other places. It is really important to have some sort of reflection blur for your skin if you are after realism; however, as always, it depends on the look that you are after. If you are trying to achieve a really wet look, you will have to decrease this value in order to get the nice sharper reflections seen on wet surfaces. The samples value works like in the other nodes; the higher this value, the cleaner the blurry reflections will be but the longer it will take to render.

When you are finished adjusting the separate values, go ahead and turn every option on to make any necessary final adjustments. Figure 14a-12 shows the test sphere with all of the options on. From here it can be changed or fine-tuned further as needed.

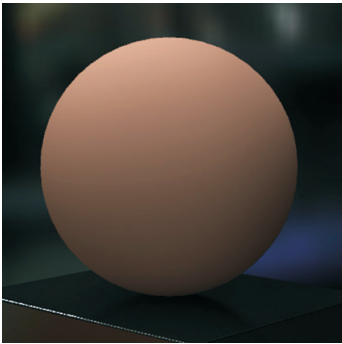


Figure 14a-12: Using Fast Skin

**Make Material**

This node allows you to make materials out of the various Shader nodes. You will notice that this node has no parameters in its Edit panel. Instead, Make Material has inputs for Diffuse, Specular, Reflection, Refraction, and Transparency shading. For more predictable results, the connections should be of similar types. However, feel free to experiment and make dissimilar connections; you might come up with some cool-looking and interesting effects.

**Material Mixer**

Material Mixer is very similar to the Mixer tool with the exception that it is designed to mix, well, you know... materials. The amount of mixing is controlled by an Alpha input that can be manually set or controlled by other nodes in the network.

**A and B** — These are the materials to be mixed.

**Alpha** — The percentage of mix between A and B; 0% equals no mix taking place. You can use other nodes in the network for the Alpha, including 2D Textures.

Sigma

This is an excellent subsurface scattering material that is perfect for the rendition of semi-translucent surfaces. You can create several different looks with this material, from various types of plastic to marble or wax. This is a good material to experiment with and really have some fun discovering different looks, but be prepared for long render times when you are ready for that perfect final image. This is another material that takes advantage of the Volume Stacking feature in LightWave v9.3

Let’s take a look at the Edit panel for Sigma and see what all of the parameters do.

Basic Tab

- Surface Color** — This is the overall color of the surface. You can use other nodes in the network or just simply input a color value manually.
- Specular Color** — This is self explanatory and works exactly the same as in other Material nodes. Here you can specify the color of the specular reflection highlights; as with the Surface Color option, you can use other nodes in the network or just input a color manually.
- Specularity** — Earlier I mentioned that this is really Reflectivity. This allows you to control the amount of reflectivity of the surface. Remember that this is an energy-conserving material, so if Specularity is set to 100%, the Diffuse value of the material will be 0%.
- Roughness** — This works in tandem with Reflection Blur in the Advanced tab of the node’s Edit panel. Roughness controls how blurry the reflection is; the higher the percentage, the blurrier the reflection will be. Make sure that you activate Reflection Blur in the Advanced tab of the node.
- Bump Height** — This controls the magnitude of the bump vectors, so if your bump is too strong or not strong enough, you can fine-tune it here without having to change the node network connected to the Bump input.
- Translucency** — This controls how much light is allowed to penetrate the surface before leaving at a different angle. You can use other nodes in the network or just enter a value. You can use a texture to describe which areas of the surface are more translucent than others; if you type in a value, the whole surface will be equally translucent. Figure 14a-13 shows two examples of how light is allowed to penetrate the surface and scatter inside. The left image shows that very little light is allowed to penetrate the surface,

while the image on the right shows that plenty of light is allowed to penetrate and scatter inside, making it look like the surface is illuminated from inside.



Figure 14a-13: Using Translucency

**Absorption Color** — Ah, now things get a bit more interesting... At first glance you might think that this is the internal color of the surface. In reality, however, this color will be removed or completely absorbed as the light ray travels through the surface. So if this color is red, red will be absorbed from the light spectrum and will not be visible. Of course, it depends on how much Absorption is applied to the surface, which leads us to...

**Absorption** — This parameter controls how much light will be absorbed as it travels through the surface. This works together with Absorption Color; the higher the value, the greater the absorption of light, and therefore the greater the amount of Absorption Color is consumed. Play with both of these options together to see what kind of interesting looks you can get. Figure 14a-14 shows Absorption in action.



Figure 14a-14: Using Absorption

**Distance** — As with other SSS nodes, this controls how far the light travels into the surface.



**Refraction Index** — This value, as discussed before, determines how much refraction results in the material. The higher the number, the higher the density of the material, and therefore the greater the distortion. This can be controlled by other nodes in the network or by simply entering a value manually.

**Gamma** — This is a built-in gamma correction that allows you to adjust brightness and contrast simultaneously.

**Samples** — This is the number of directions that the shader evaluates in order to calculate how the object is supposed to be shaded. The higher the number, the smoother the shading, but the longer it takes to render. I usually use low Samples values for test renders and higher values for final renders.

**Pass Light Inside** — This can create some interesting effects. If this option is on, everything inside the object with this material applied will receive illumination. Try this with a luminous object inside the sigma object and see what kind of effects you get.

**Advanced Shading** — If you have objects inside of the object with this material applied and you have turned this parameter on, the rays will also hit the objects inside. Otherwise, the rays will only hit the SSS surface, ignoring the objects inside.

**Subsurface Radiosity** — This just allows for radiosity to be calculated in the subsurface of the material. If you have an HDRI setup or luminous polys, then you need to turn this on; otherwise, only virtual LightWave lights will be transmitted throughout the material.

In the example shown in Figure 14a-15, I added a luminous sphere inside the sculpture's head, with each render having a different amount of luminosity in the sphere.

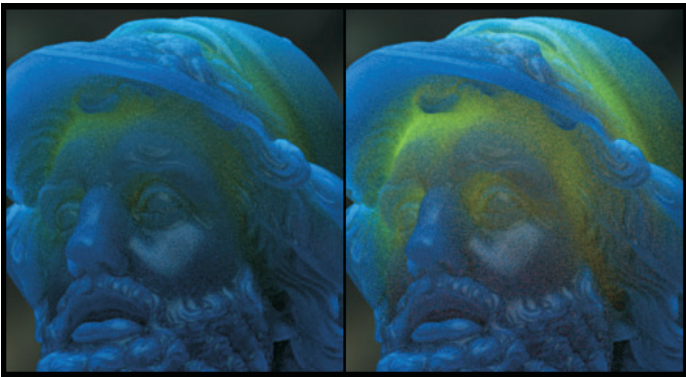


Figure 14a-15: Advanced Shading and Subsurface Radiosity in action

**Advanced Tab**

**Reflection Blur** — Here you enable reflection blurring for the material. If you turn this on, the reflection will be blurred according to the Roughness value in the Basic tab.

**Sigma2**

NewTek’s programmers made improvements to the SSS Sigma node, but in order to remain compatible with surfaces created in v9.2, NewTek decided to keep Sigma as is and add a different version of it for the future, which is how we ended up with Sigma2. This version of Sigma renders faster than its counterpart and has less noise. When it comes to Surface Color and Specularity, Sigma2 is virtually identical to Sigma, but when it comes to its translucent and transparent qualities, the two versions are quite different. In Sigma2, the back faces of the polygons are handled differently. The object first preprocesses the lighting and then it is blurred. The back faces of the object are then available to be used for transparency, which is lacking in the original Sigma.

**Basic Tab**

**Surface Color** — This is the overall color of the surface. You can use other nodes in the network or simply input a color value manually.

**Specular Color** — This is self explanatory and works exactly the same as in other Material nodes. Here you can specify the color of the specular reflection highlights. As with the Surface Color option, you can use other nodes in the network or just input a color manually.

**Specularity** — Remember, in the other Material nodes I mentioned this is really Reflectivity. This allows you to control the amount of reflectivity of the surface. This is an energy-conserving material, so if Specularity is set to 100%, the Diffuse value will be 0%.

**Roughness** — This works in tandem with Reflection Blur in the Advanced tab of the node’s Edit panel. Roughness controls how blurry the reflection is; the higher the percentage, the blurrier the reflection will be. Make sure that you activate Reflection Blur in the Advanced tab of the node.

**Scattered Color** — The subsurface scattering layer of this node starts with this option. Here you can specify a color for the volume inside of the object.

**Distance** — As with other SSS nodes, this controls how far the light travels into the surface. The higher the value, the farther the light travels as it is absorbed by the surface, and therefore the greater the self-illumination appearance of the object.

**Gamma** — This is a built-in gamma correction that allows you to adjust brightness and contrast simultaneously.

**Quality** — Here you control how good the quality of the shader will be when rendered. The lower the value, the faster it will render but the more noise you will get in the final image.

**Refraction Index** — This value determines how much refraction (distortion) results in the material. The higher the number, the higher the density of the material, and therefore the greater the distortion. This can be controlled by other nodes in the network or by simply entering a value manually.

**Transparency** — This parameter controls how much light is allowed to pass through the material.

**Transparency Color** — This parameter works in tandem with Transparency. The more transparent the object, the more the transparency is tinted with this color.

**Bump Height** — This controls the magnitude of the bump vectors, so if your bump is too strong or not strong enough, you can fine-tune it here without having to change the node network connected to the Bump input.

**Advanced Tab**

**Reflection Blur** — Here you enable reflection blurring for the material. If you turn this on, the reflection will be blurred according to the Roughness value in the Basic tab. Reflection Blur works the same way as Refraction Blur. The higher the value, the smoother the blurring will be.



Figure 14a-16: Different Sigma2 looks

## Simple Skin

This was the first Skin material node included in LightWave. It was introduced in v9.2 and improved upon based on user feedback. Instead of updating this node, for the sake of compatibility NewTek kept it as is and added a new node to the repertoire — Fast Skin, which was covered earlier. I like Fast Skin better since it provides a little more control of light backscatter and it renders faster than this node, sometimes by a great amount. Try both nodes and see how you like them; you might prefer one over the other for many different reasons.

### Basic Tab

**Diffuse Color** — This is the overall color of your surface. This is where you would connect a painted texture if you happen to need one. If you are going for realism, this texture is extremely important. Paint all of the details seen on skin, from beauty marks to scar tissue. Take your time painting this, as the look of the model will only be as good as your textures are.

**Diffuse** — You are probably familiar with what diffuse is; if not, see Chapter 4, “Surface Attributes.” To recap, this option controls how much light is reflected and how much light is absorbed by the surface, so the higher the value, the brighter the surface. More often than not you will want this value to be low.

**Respect Bump** — If you have a normal map from ZBrush, for example, connected to the Fast Skin node and you notice that it isn’t as strong as it should be, increase this value. It controls how strong the map will appear on the surface. It is also important to know that Simple Skin has inputs for normal maps and bump maps; you can have both on your network and create some interesting bump details.

**Specular Color** — You can specify a color for your specular reflections, or you can connect other nodes in the network.

**Specularity** — As previously discussed, this is really “Reflectivity” since that’s what it actually controls. The higher the value, the more reflective the surface will be.

**Glossiness** — This works in conjunction with Specularity. A rough surface will have a wide specular reflection, while a wet and smooth surface will have a very tight specular reflection. The higher this value, the tighter the specular reflection will be.

**Fresnel** — This is the phenomenon of the varying amount of reflectivity depending on the angle at which the surface is viewed. The higher this value, the more reflective the surface is at glancing angles.

**Refraction Index** — This value determines how much refraction results in the material. The higher the number, the higher the density of the material, and therefore the greater the distortion.

**Epidermis Visibility** — Just like in Fast Skin, the epidermis is the outer layer of skin. This value controls how visible this layer is.

**Epidermis Color** — This works just like in Fast Skin, which was described earlier. Here you can specify what color the outer layer of skin is by entering a color manually or from other nodes in the network; keep in mind that this layer actually contains very little color. You can easily create a texture for this option that is derived from the diffuse texture. In your image editing program of choice, you can make the diffuse texture a lot more pale looking and not as saturated. This will give you a good base to start with, and most of the time that's all you have to do to get good results.

**Epidermis Distance** — This controls how far light travels through the outer layer of skin. Keep this value really low. 5mm should be enough in most cases, but as always it depends on your model and the look that you are after.

**Epidermis Gamma** — With this option, you can adjust brightness and contrast together in this particular layer.

**Epidermis Samples** — This works in a similar way as blurry reflections and refractions, but as the name implies it affects the smoothness of the epidermis. The higher the value, the smoother it'll be, but the longer it will take to render. You will need to balance the quality vs. render times.

**Subdermis Visibility** — The subdermis is also called the hypodermis, which is right below the dermis. For all intents and purposes, the dermis and subdermis are the same thing in this node. There really is no need to treat these two separately since they both contribute to the fleshy feel of the skin. This value controls how visible the subdermis is.

**Subdermis Color** — You can enter a color manually, but if you are going for realism you can create a dedicated texture. It is common for this texture or color to be a semi-saturated red of medium brightness to mimic the blood and muscle in the body; this is what gives you that nice soft reddish color in your surface.

**Subdermis Distance** — This controls how far light is absorbed into the inner layer of skin.

**Subdermis Gamma** — With this option, you can adjust brightness and contrast together in this particular layer.

**Subdermis Samples** — This works in a similar way as blurry reflections and refractions, but as the name implies it affects the smoothness of the subdermis. The higher the value, the smoother it'll be, but the longer it will take to render. You will need to balance the quality vs. render times.

**Bump Height** — This controls the magnitude of the bump vectors, so if your bump is too strong or not strong enough, you can fine-tune it here without having to change the node network connected to the Bump input.



Figure 14a-17: Simple Skin

Standard

Standard replicates the built-in shading model of LightWave found in the Basic tab of the “classic” Surface Editor. When you open the node’s Edit panel you will find an Advanced tab, which mimics the Environment tab of the Surface Editor with added options. These include Reflection Blur and Refraction Blur, which are useful for creating effects like metals, plastics, glass, and liquids. This node is extremely useful when you need to layer several textures in a single node; besides helping you keep things organized, it also keeps your workspace nice and tidy since there are fewer texture nodes in the workspace. The Standard node also comes in handy when you are creating materials with different IOR (Index of Refraction) values such as liquids and glass.

Switch

You can compare Switch to the Logic node since you can use it to assign different properties to each side of a polygon. This is very useful for creating glass, liquids, and any other semi-translucent material. Remember that your surface has to be double sided and the Polygon Side output of the Spot Info node has to be connected to the Switch input inside the Switch node in order to assign different materials to the polygon sides correctly.