RadiosityTut1MV.html
RadiosityTut2MV.html
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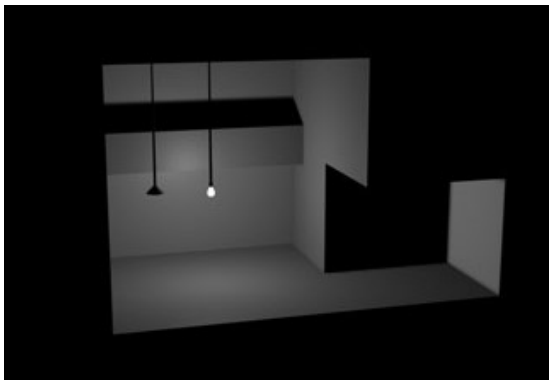
MV's Cinema 4D

Scenefile: RadiosityTut2&3MV.c4d.zip

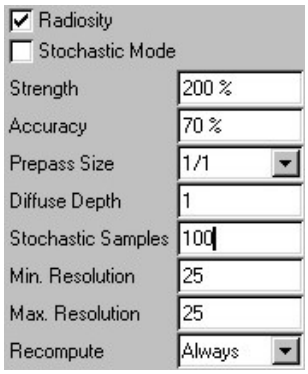
This page will examine the relationship between stochastic samples and min and max resolutions. Stochastic samples is the number of rays sent out from a sample to look for a light source. Min Resolution is the number of samples taken in a flat area. Max Resolution is the number of samples taken in a curved area. It also generates extra samples in corners. Don't confuse stochastic samples (number of rays each sample has) with samples. Samples are the number of places sampled in an area and is determined by the min and max resolutions. The stochastic sample value determines the quality of the sample, while the resolution determines the number of samples.

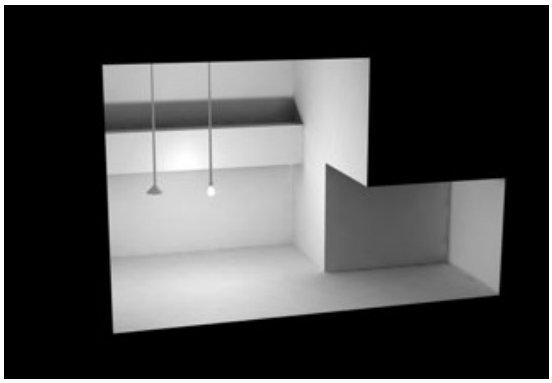
Times shown are the render time on my dual Athlon 1800 WinXP machine



In this example, the room is first lit by a single omni (soft shadow) first without radiosity.

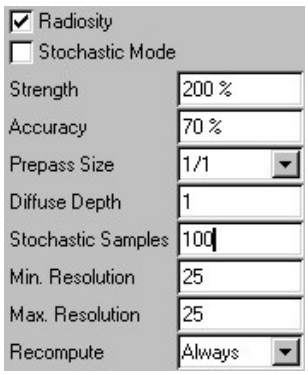
00:01

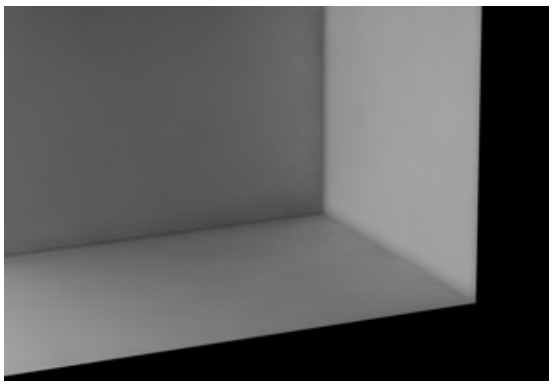




Next we turn on radiosity with the settings shown on the left. I've set strength to 200% for clarity purposes. The render shows some artifacts in the corners especially in the room on the right.

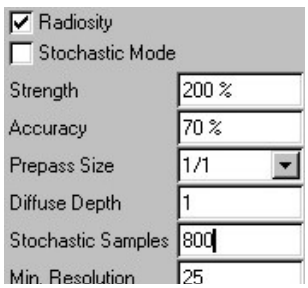
00:07

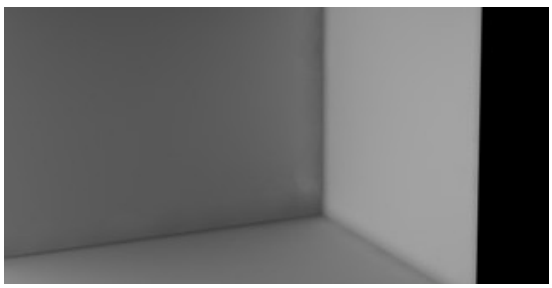




Here is a closeup of those artifacts. It's hard to know if the artifacts are the result of the low number of samples or the low number of stochastic samples.

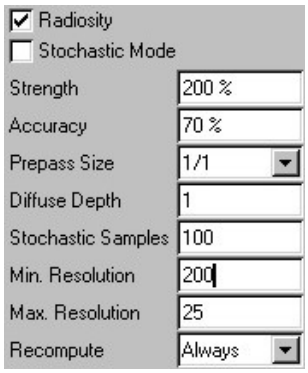
00.02

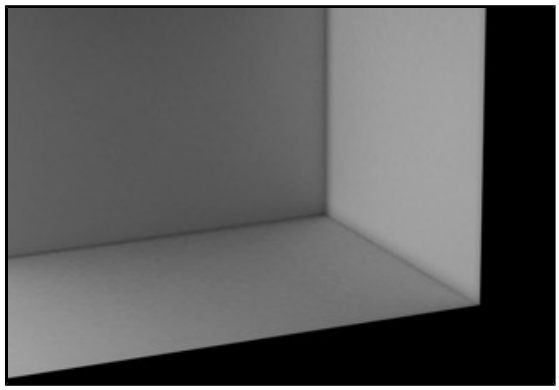




Increasing the stochastic samples value to 800 does little to help. So in this case it's not the quality of the samples, but the number of them.

00.09

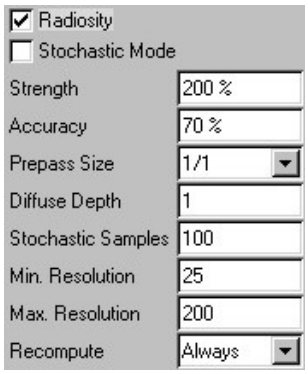


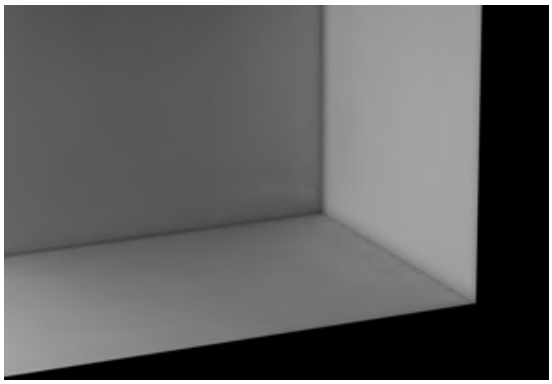


Increasing the min resolution to 200 instead produces a better result. Why? Because the corners are slightly darker than the middle of the wall, some of the samples don't line up in a nice row relative to the corner. With few samples, some of them will be close to the corner while some are further away. Areas along the corner of the wall that have a sample point nearby will be darker, while areas that have a sample point further away will be lighter. This creates the splotchiness. Increasing the sample quality won't help because even with a better samples, there aren't enough.

Click the picture to see the point sample distribution. Notice how extremely dense the samples are.

00:37

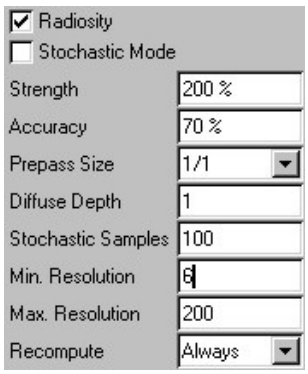


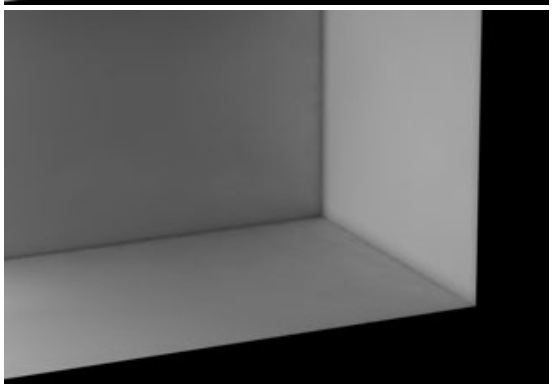


Instead of increasing the min setting, you can instead increase the Max setting. This will add more samples to just the edge area. Since the edge is where we're having the most trouble, increasing Max setting gives us more points where they're most needed. The render is nearly as good in a fraction of the time.

Click the picture to see the point sample pattern. Now the samples are denser in only the corner areas.

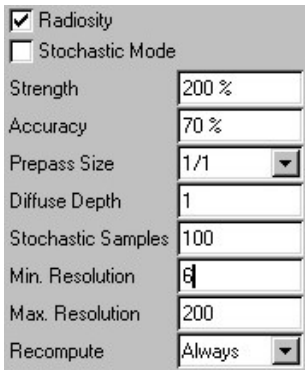
00:04

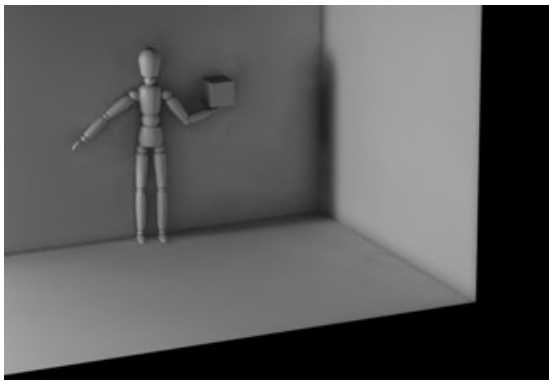




We can decrease the min samples even more with pretty similar results. Click the picture to see the point sample pattern now. You can see that the corners have many samples while the wall centers have few. But look at the render time. The time has nearly doubled without a better result. The reason is because Cinema interpolates between the relatively few samples to smooth things out. In some cases, not all, using fewer samples can give you a smoother result because of this. The problem is this interpolation takes time and you may end up taking longer to render with the same or even inferior results.

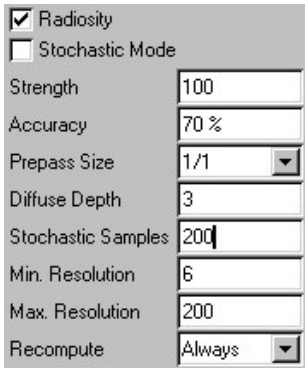
00:07

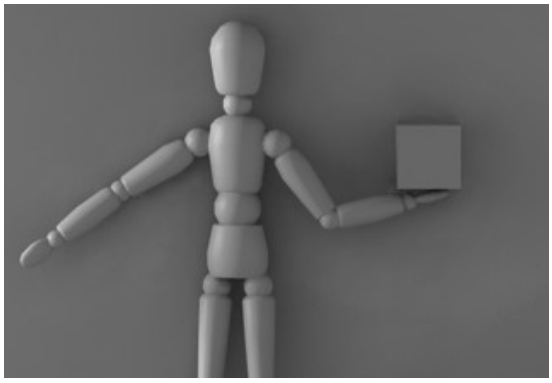




There is another problem with having few min samples. Radiosity shadows won't be rendered quite as well. Here I've added a man to the scene to illustrate the problem.

00:16

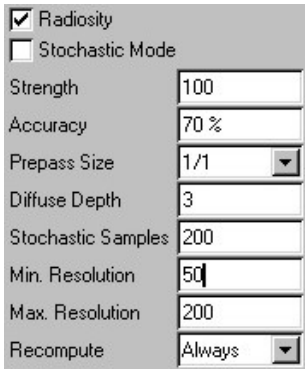


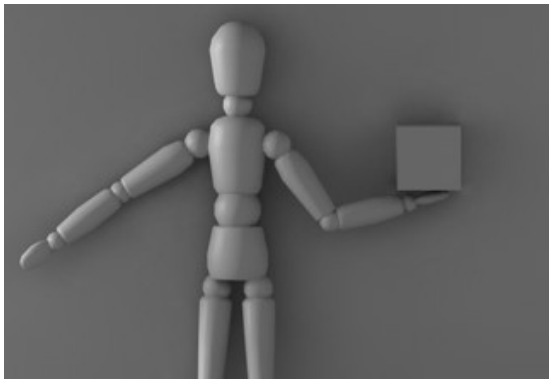


Since we're using bounced light here I've increased the stochastic samples to 200 and increased the Diffuse Depth to 3. The extra bounces increase overall illumination, so I turned down the strength to 100%.

Shadows in radiosity aren't like soft shadows. They appear when rays sent out from sampled areas don't find a light source. When there are few samples being taken, the few samples that are taken are averaged. This can result in lesser intensity or ill defined shadows. If you notice floaty objects in your scene, this is likely the problem. The max resolution setting did add some extra points on the wall around the figure, so the result is not too bad, but it's not a good as the render below.

06:40





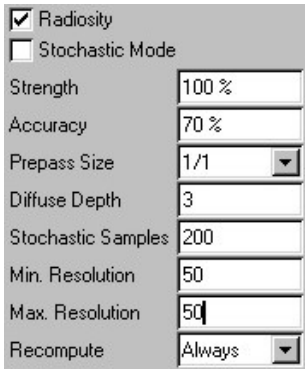
In this render the min setting was increased to give more samples on the wall. The shadows are now more defined and darker due to the extra samples and less averaging. The render was also done in one third the time. Again, this is because sample averaging takes time.

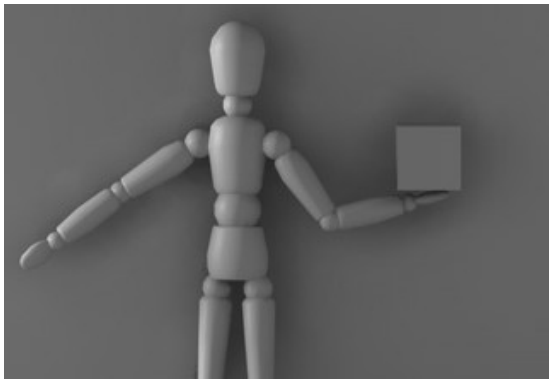
Click the pictures to see the point sample patterns.

02:07

It's easier to see the quality difference clicking between the two renders. Click on the image to alternate renders. The lighter shadowed render is the one that took three times longer.

Note that the higher stochastic value setting you use, the less time you'll save trying to minimize averaging. Determining the best settings for min resolution, not too many and not too few requires experimentation. In general, the higher the stochastic value you need, the fewer samples you should try to get by with because rendering lots of ray intensive samples takes alot of time.





We can make the render faster again by almost half by reducing the Max Res setting down to 50. The shadow isn't as good as the 2:07 render but it is nearly as good as the 6:40 render, and in a fraction of the time. Making the Max setting lower than the min setting has no effect.

01:09

Achieving the fastest render with the best quality is a matter of determining the minimal stochastic sample value required, then finding a Min Resolution value that is neither so low that it slows the render down because of averaging, or needlessly high which will also slow you down. Increasing the Max Resolution will add samples to corners and curves. The need for a high Max Resolution values decreases as the value of your min setting increases. Knowing how each setting can help or hurt you and finding the best compromise amongst them all is the key to good radiosity renders.

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RadiosityTut3MV.html