

About textures

The best and easiest way to create a texture is usually from a retouched photo (in Photoshop®, (the best tools to use are: clone/stamp, filters applied in masks) tailor-made for that one surface. The worst textures are usually procedural in nature (with no layers), and in-between the best and worst methods mentioned comes the textures that have been hand painted from scratch in a computer, although if we're not careful it can turn out the worst of the lot! The reason for this is partly that painting anything is very difficult, and especially using a computer. Mainly there's the problem with the airbrush. A real airbrush should never be used freehand, the results are almost always terrible, it should always be masked one way or another, with a loose or stuck down mask. Same thing happens in the computer (except its even worse because a real airbrush is much more flexible and controllable); the reason for this is the uniformity and smoothness of the lines, sometimes with the little globules at the start and end of every stroke. An example of this can be seen in the screenshot below:



Things that will help this problem (using Photoshop® terms): taking the extra time to change the stroke length, transparency, color and size of the brush VERY often, using smudge, using many different selection-masks with different amounts of feathering, a pressure sensitive tablet and stylus, adding many different filters in many different masks, working with many layers. In the screenshot below, here's the same picture again, this time after 7 minutes more work (without a tablet), still rubbish, but now at least usable as a reflection map:



You should avoid repeating textures at all costs - an example: you have to shade the floor of a large hall with a granite texture. It's a nice texture, but the problem is it's not big enough (not surprising), it has to be repeated 100 X 150 times at least. But when you render a view from average human eye-level looking across the hall, you see this horrible weird zigzag pattern extending across the floor. Mirroring and Staggering doesn't seem to help, in fact Mirroring made it worse by making the zig-zags bigger. So how should you go about fixing it?

One way is to use a 'smear-map' (look it up in the manual) with much less repeats than 100 layered on the main texture - a subtle one will be enough. Another way is to layer textures on each other, with different repeats. Say you have a checkered pattern that repeats 12 times across a floor - layering another texture (same or different) on top in either the RGBmult or RGBoffset that repeats 11 or 10 or 9 times will make it less repetitive.

Another way is to open the image in Photoshop®, paste it as many times as you like in a larger window, and then make sure it's non-repeating by painting and retouching, then reapplying it in your shader with less repeats. But be aware that this creates larger image files, eating disk space, RAM, and slowing shader-updating.

The 9 rules of reality-based CG

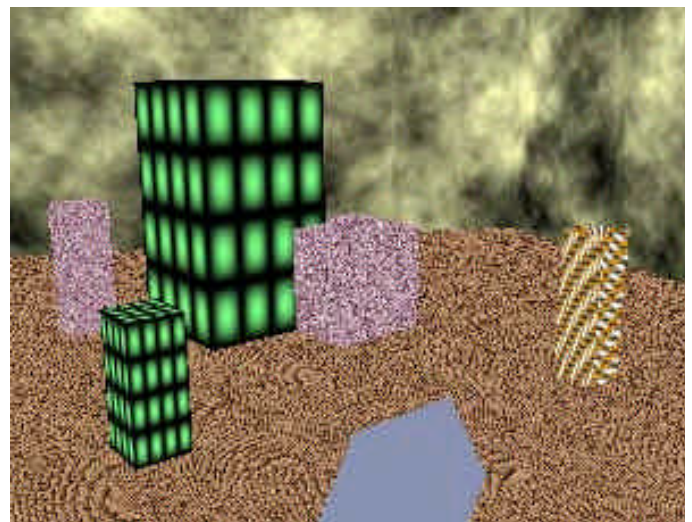
We can think about the elusive goal of realism as a scale in a lake, with zero on the surface and positive numbers going up into the sky, and the practitioner of 3d Computer Graphics as a swimmer with lead weights chained to him - he has to struggle hard just to reach and stay close to zero. This is because what we're dealing with in CG is just a bunch of numbers - what we humans enjoy most about reality, detail, variation, chaos, randomness is alien to the realm of numbers.

Of the 'representative' arts (like some painting, 3d CG, traditional sculpture, and photography) 3d CG unfortunately has the largest 'lead weights'. This 'swimming' will probably become more automated in the future, but for now it's a 'manual' labour, and in my opinion, vitally important.

For more information on the role and value of details and variation to our perception -- **click here**

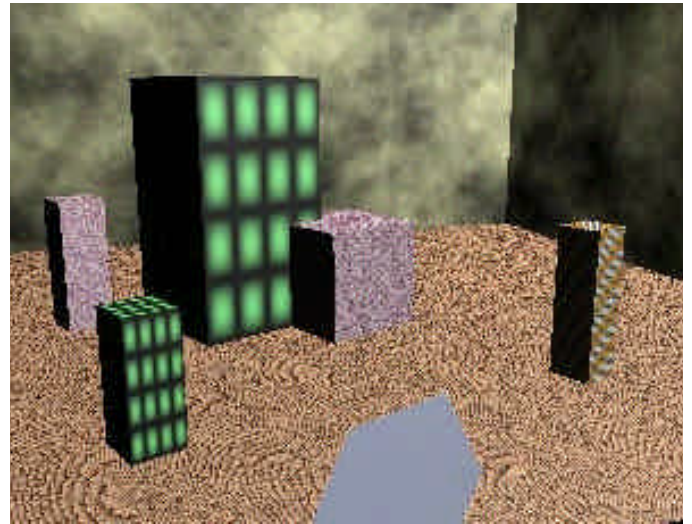
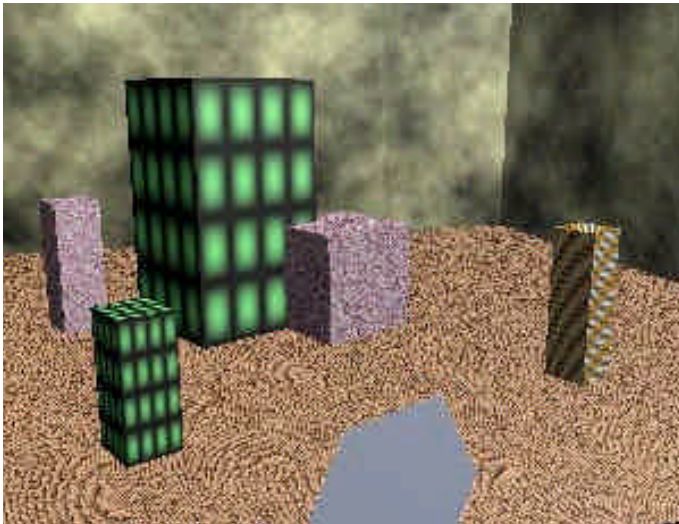
Here are 4 major, and 5 minor, things to remember to 'stay floating' in cg, in order of importance.

In the screenshot below, this is what an image looks like when all these 9 items are left out of it. Notice how confusing, flat and uninteresting it is:



1. Shading

Add shading to the objects in the scene, the different shades of light and dark that describe the forms - in Alias it's just a matter of placing at least one light, and making most of the shaders Lambert, Phong or Blinn, NOT 'Lightsource'. Don't use incandescence too much. Note that the ambient light is too strong (a common mistake) in the left one, and corrected at right.

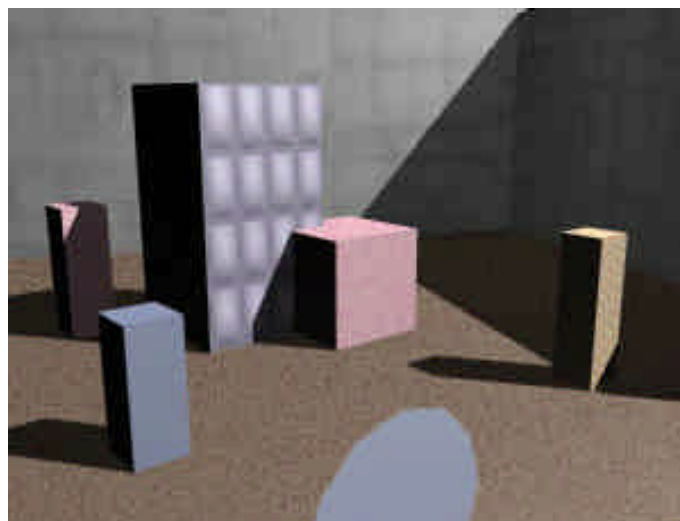


2. Shadows

Add shadows to all objects that are not transparent.

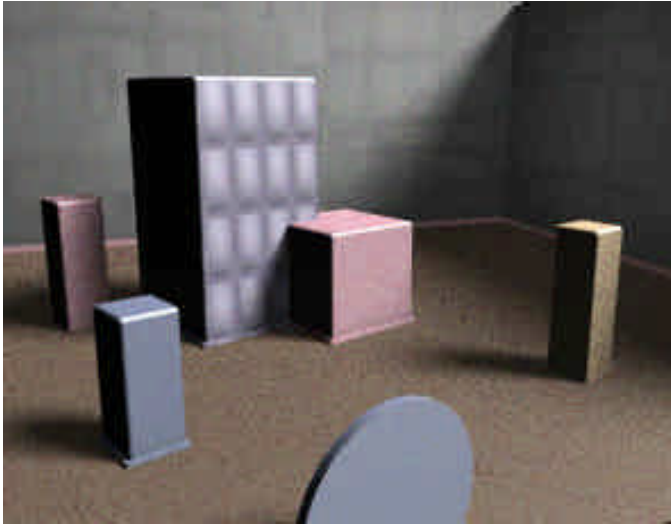
3. Texture

All textures must be above a certain level of complexity, or they must be very muted. NEVER use a simplistic texture, like a procedural (Fractal, Bulge, Ramp, Marble etc), on it's own with very high contrast.



4. Modelling

Thin planes that are not very far away must have some thickness, bevels should always be added if visible, details are almost always not enough so add more (fillets, flanges, ridges, dents, seams, bolts, panels, etc), and the polygon resolution must not be too low in rounded objects (if you can see facets where there are supposedly none, it's too low). Here I've also added some radiosity effects, like ramps on some textures, and raytraced soft shadows.



The following points are optional, but recommended whenever possible or suitable:

5. Glow: (on very bright areas in the image).

6. Realistic lighting effects: FX like Radiosity, Caustics, Anisotropic highlights, etc (real or faked).

7. Fog: (rarely, but keep it in mind)

8. Motion: blur, if you have much fast movement close-up .

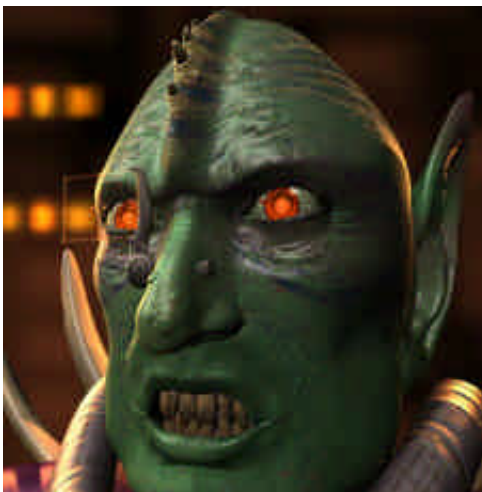
9. Blur and film grain: (always, a computer will render things too sharp and smooth every time) (Depth of field is so very rarely useful, and time-consuming to render, I won't go into that here, except to say that Maya users can fake it by rendering in layers like background, middle and foreground, and then blurring them selectively in post production.)

The trouble with CG highlights

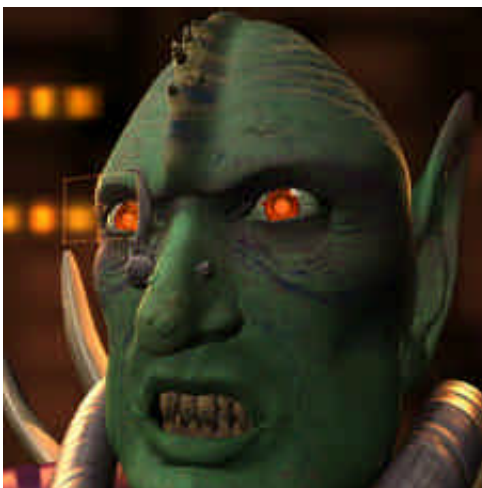
In Alias, as in most other rendering software, the highlights are a bit inflexible. There is very little control of their falloff - basically there is a choice of Phong falloff, and the very similar Blinn falloff. You can combine different highlights in layers, but that's still not enough for some jobs.

Here are two ways to get a more realistic highlight on wet looking surfaces.

First, render your scene without highlights on the surfaces in question. Then you make all shaders a total black (although if you have bump and displacement somewhere, keep these channels as they are). Check that there isn't any small amount of incandescence somewhere you forgot, turn off any Glow and Translucence, and delete the ambient light for safety. Check that all your lights are neutral in color. Now make all shaders Lambert EXCEPT the ones you want to work on - make them Phong, set the highlight size to 25, and overdrive the Specularity Value up to 8. Raycast (Dmap), without any shadows. If it looks too smooth, add a bumpmap. This now becomes a black and white mask you can use to composite in your choice of strength and color highlight on the original image. The second rendering pass need take very little extra time even for an animation, since it can be done without shadows and at a lower resolution.

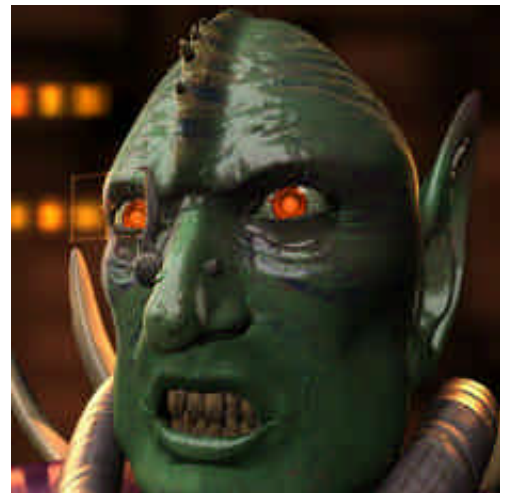


The first image is using Phong Spec 0.78, Shinyness 20 on the top layer of the skin, and a touch of Spec in the lower Blinn layer. It already looks quite good, however, sometimes just a little bit more is needed.



So then, here the second image has no Spec in the top layer.

This, the third image is the mask.



Lastly, this the fourth image is a composite of number 2 and 3 (using Photoshop, layered as Screen, at 40%, then flattened).

A variation on this technique invented by Jeremy Birn (you should check out his excellent website at www.3drender.com. Jeremy's method is to not use Specularity for the mask, but Reflectivity - by placing geometry in your scene textured like windows or other light sources, reducing Specularity and raising Reflectivity, raytrace. This produces even more realistic results, but usually much slower.

The concept of multiple pass rendering for later compositing is a very useful one, and can be used in many different ways to speed up production, and add flexibility and choices towards the end of a project. It can be used to separate each light source and its effect on the scene, it can be used to create your own motion blur, it can be used to separate glow effects, particles, foreground/background, super-high-resolution parts from normal or low res, raytraced effects from raycast, fake fog and Depth-of-Field effects, etc. In respect to the final rendering - always add a certain amount of blur and grain in your images, as I've said before, it makes a subtle but important difference. For printing, you can enlarge the final image in Photoshop 200 - 400% without obvious loss of quality, especially if you add grain (though that has to be done last!). A big problem with cg is that it's far too sharp anyway, especially at high resolutions, so lower the rendering resolution and save time as well.