

7M836 – Animation and Rendering

Exercise 7a: 2D Mapping

This exercise will

- show you the subtleties of 2D and 3D texture mapping.

Background information in the on-line documentation:

- [3.8 Simple texture options](#)
- [3.9 Advanced texture options](#)
- [6.7 Textures](#)

Render the file `ch6/twodim.pov`. An object's rotate, scale, and translate statements can affect the texture. If you place the rotate, scale, and translate statements **after** the texture statement like this:

```
sphere {
    texture { . . . }
    rotate < . . . >
    scale < . . . >
    translate < . . . >
}
```

then the texture will move with the object as it is oriented, sized, and positioned in a scene. Sometimes, however, it is necessary to adjust the texture relative to the original object's shape before the ultimate sizing and positioning take place. One way of doing this is by adding rotate, scale, and translate statements **inside** a texture statement.

Find the cylinder in `twodim.pov` and take a look at its texture statement. There is a rotate command inside the texture statement. To see what it does, remove it temporarily by placing two slashes (`//`) in front of it like this:

```
// rotate <0, -60, 0>
```

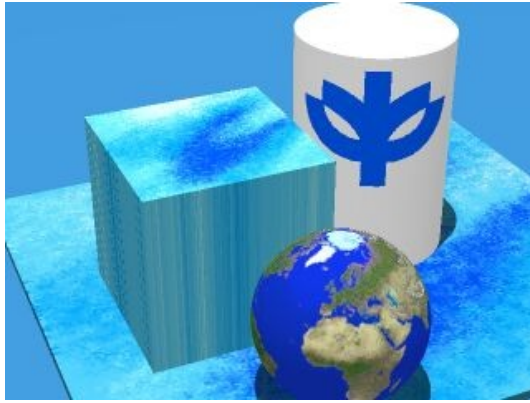
This turns the line into a comment and POV-Ray will ignore it. Render the image. What is the difference between this image and the original? What was the purpose of the rotate command?

When you are done, remove the two slashes that you inserted in front of the rotate command.

Now you will examine the importance of the order of a texture statement relative to rotate, scale, and translate statements. At present, the front of the square block has a single dark blue "U"-like shape pattern on it. In the `twodim.pov` file, move the block's scale and translate statements so that they come before the texture statement. Render the scene. How has the texture changed on the block? How do you account for the change?

When you are done, restore the block's scale and translate commands to their original positions in the file.

In the next activities, you will make changes to the scene's texture commands. When you finish, you will have an image that looks like next image.



Include a rotate command that will put the dark-blue "U" shape on top of the square block. Remove the specular reflection of the sphere. Texture map the sphere using the file earth.tga. What map type did you use? What rotate command did you use to get the Netherlands centered on the sphere? Where you did place it? Move the texture map on the cylinder in upward direction so that the entire blue pattern is visible. What type of command did you use? What numeric values did you use? Where did you place the command?

Exercise 7b: 3D Mapping

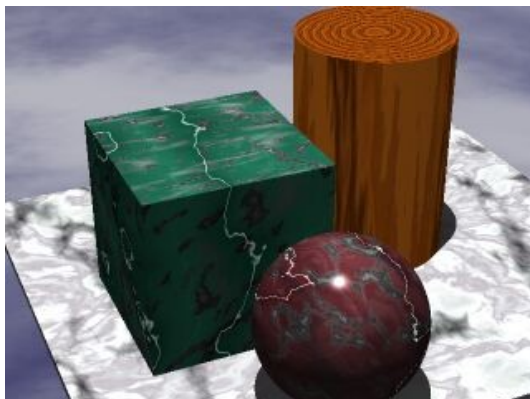
This exercise will

- show you the subtleties of 3D texture mapping.

Background information in the on-line documentation:

- *3.8.4 Pre-defined textures*

There is an enormous number of intriguing predefined textures available in POV-Ray. While carrying out the next set of activities you will get a chance to experience them for yourself. Once you finish these activities, you will have an impressive image whose use of texture is so extreme that it borders on bad taste. A preview of your image is depicted below.



Look in the "scenes\incdemo" directory of your POV-Ray installation. On this visit we are interested in the contents of the woods, stones, and skies subdirectories. You will want to render stones1.pov, stones2.pov, woods1.pov, and the various cloud examples in the "scenes\textures\pigments\skies" directory. They are splendid to behold. If you want to use any of these textures in your scenes, you will have to use the appropriate #include statement in your file:

```
#include "stones.inc" //Stone textures
```

```
#include "woods.inc"           //Wood textures
#include "skies.inc"           //Clouds
```

Open the file `ch6\threedim.pov`. Render the scene. Give a green stone texture to the square block, a red stone texture to the sphere and a white stone texture to the tabletop. You can find examples of each of these in `stones1.pov` and `stones2.pov`. Which textures did you use? Transform the texture of the cylinder so that there are rings radiating from the middle of its top face. What transformations did you use?

Exercise 7c: Bump mapping

This exercise will

- let you experiment with bump mapping.

Background information in the on-line documentation:

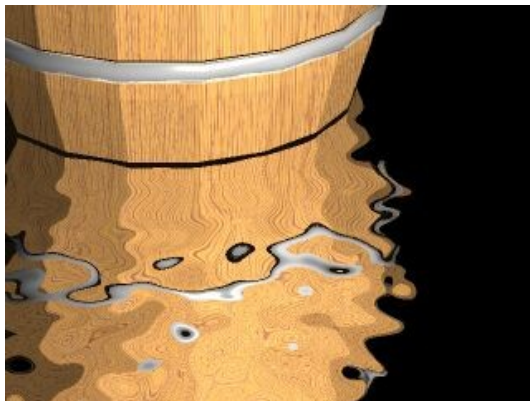
- [3.8.2 Adding bumpiness](#)

The `normal` command controls the perturbation of surface normals. It is placed inside a texture statement. Here is an example:

```
normal {bumps .75 scale 3}
```

The first numeric value controls the amplitude or the extremity of the bumps and the scale specification controls the frequency. A decrease in the scale value increases the frequency and causes the bumps to be smaller and to cluster more closely.

Render the file `ch7\box.pov`, which shows samples of available perturbation patterns in POV-Ray. Perturbing the normals of a reflective surface can produce an interesting and dramatic effect, as you can see in the image below.



Compare the perturbation pattern of the reflection in the image to the patterns you saw in the image created from `box.pov`. Which patterns can be used to create the pattern in the reflection?

Render `ch7\barrel.pov`. Notice that there is no `normal` command in the plane object, and the resulting image has a perfect reflection that is less interesting than the one in previous image. Experiment with perturbing the plane's surface with the candidate patterns and attempt to replicate the effect. It does not have to be an exact match, but you can get close. What pattern did you choose?