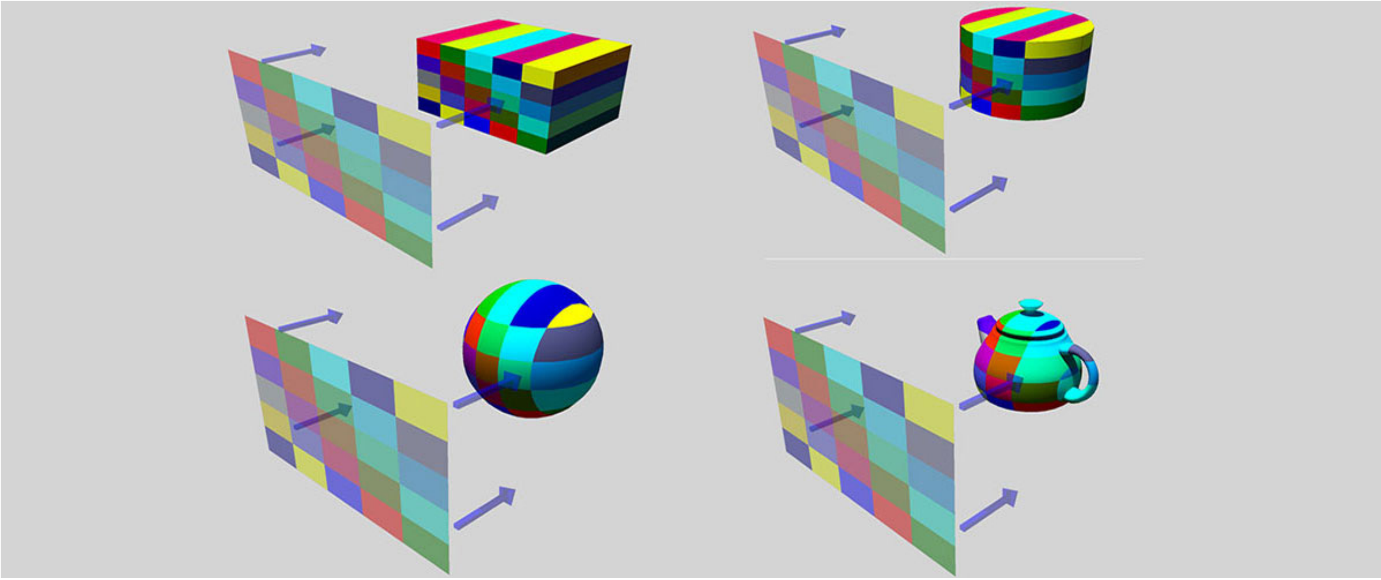
Design Course

Basic Texturing - Part 1

Level: Introductory

by
Prof. Sumant Rao and Nitin Anand
IDC, IIT Bombay



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https://www.dsource.in/course/basic-texturing-part-1/introduction

Introduction

If you have gone through the previous modules i.e.

My First Animation:
(http://www.dsource.in/course/my-first-animation) and

Bouncing Ball Animation:
(http://www.dsource.in/course/bouncing-ball-animation)

Then, you have some idea of how to create simple objects using primitives and deformers etc. But, do they look realistic? You might say 'they do' but still; do they really look real?

You would agree that they don't. Why? They are too clean. They do not have textures. Real materials react to lighting differently. Some are shiny, some have a matte finish and others have a rough, bumpy texture, etc. They have different 'Materials' which react with the light and the environment making them look real.

Materials are a critical part of creating good and realistic objects for animation. So how do we create and apply these materials to an object. Refer the below video to get the idea of how process of basic texturing works.

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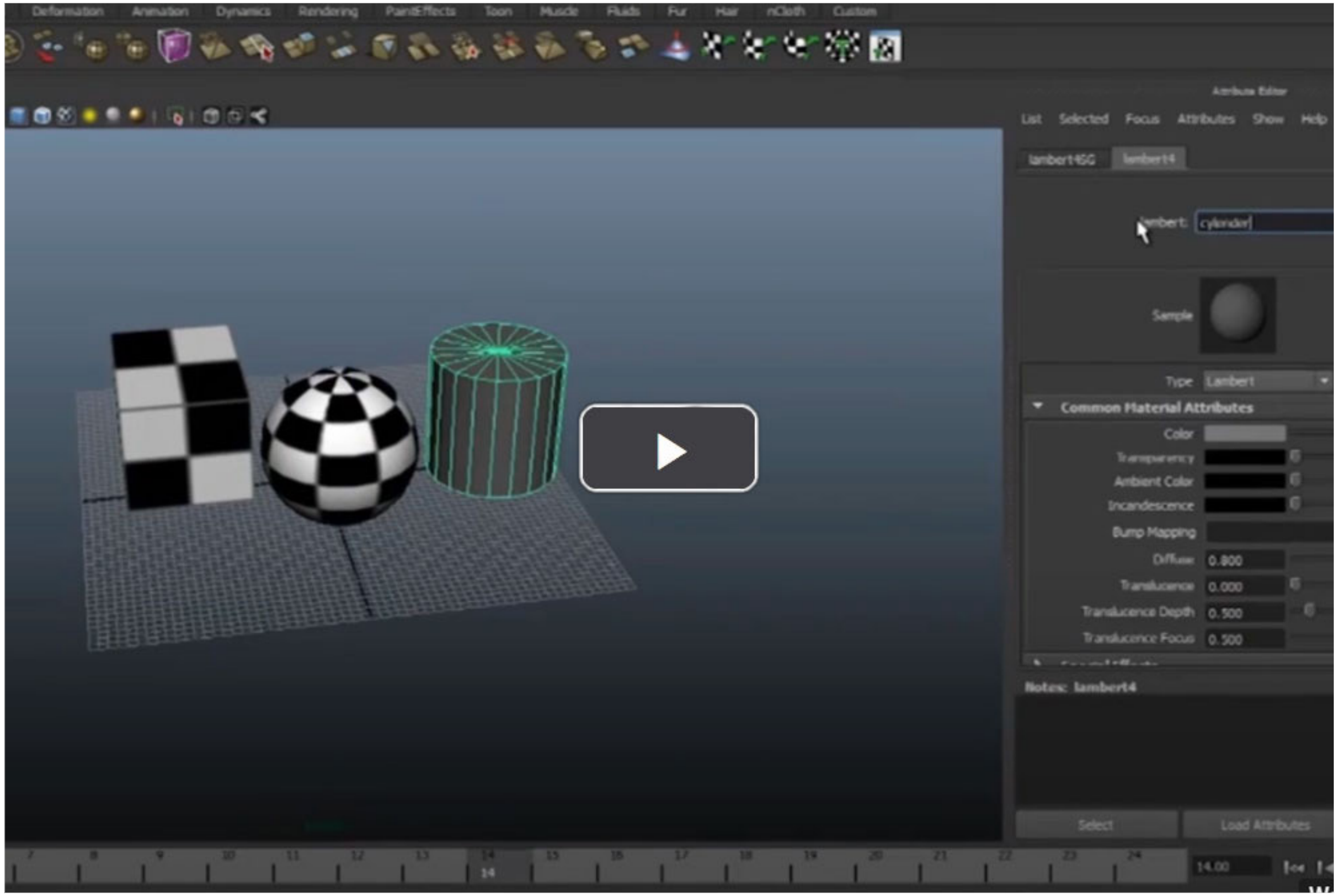

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Applying Texture

Take a look at these balls.

Though all of the above balls are basically spheres; but then, what makes them different?

Well, each of them basically has different textures applied to them. Now, Let us understand how this is done.

We are all familiar with the world map. It is a rectangular image. We also know that the earth is not flat like this map and but it is spherical.

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Note that the breadth of the top and bottom edge of the map are the same length as the equator i.e. the center, whereas in reality, these form the north and south pole, just two points on earth. Every point on the world map corresponds to a point on the earth (latitude and longitude). The same theory is used while applying textures in 3D software.

If the software knows which point of the texture is mapped on which part of the 3D object, it can create a textured object.

Since any point on the texture image can be defined by its x and y coordinates, its corresponding coordinates on the 3D surface have been conveniently called *u* and *v* coordinates and this mapping is called as **UV mapping**.

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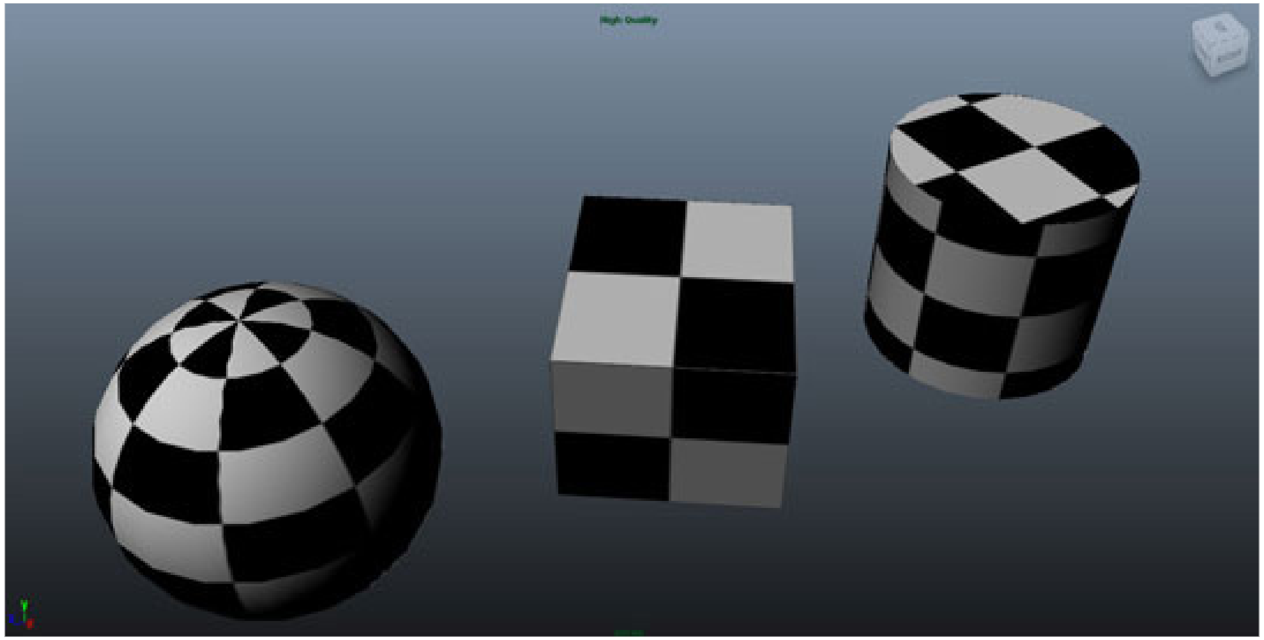
Understanding UV Mapping

Quite often, during the creation of the object, the software will create the UV mapping for it. As you can see from the video, when texture is applied to the primitive objects (like the cube, sphere and cylinder), the UV mapping already exists on them.



These also show how the most common methods of UV mapping on objects look. ie.
Planar - The texture is applied by projecting a texture onto a flat surface (similar to the faces of the box)
Cylindrical - like the wrapper pasted around a cylindrical can
and
Spherical - like the world map wrapped onto the earth.

Though all these look quite different, the method of creation is the same. In a sense, the object faces with their vertices are opened up and made flat and positioned appropriately on the texture to be applied to create the XY to UV correlation. What is different is simply the method of opening up and flattening these vertices.

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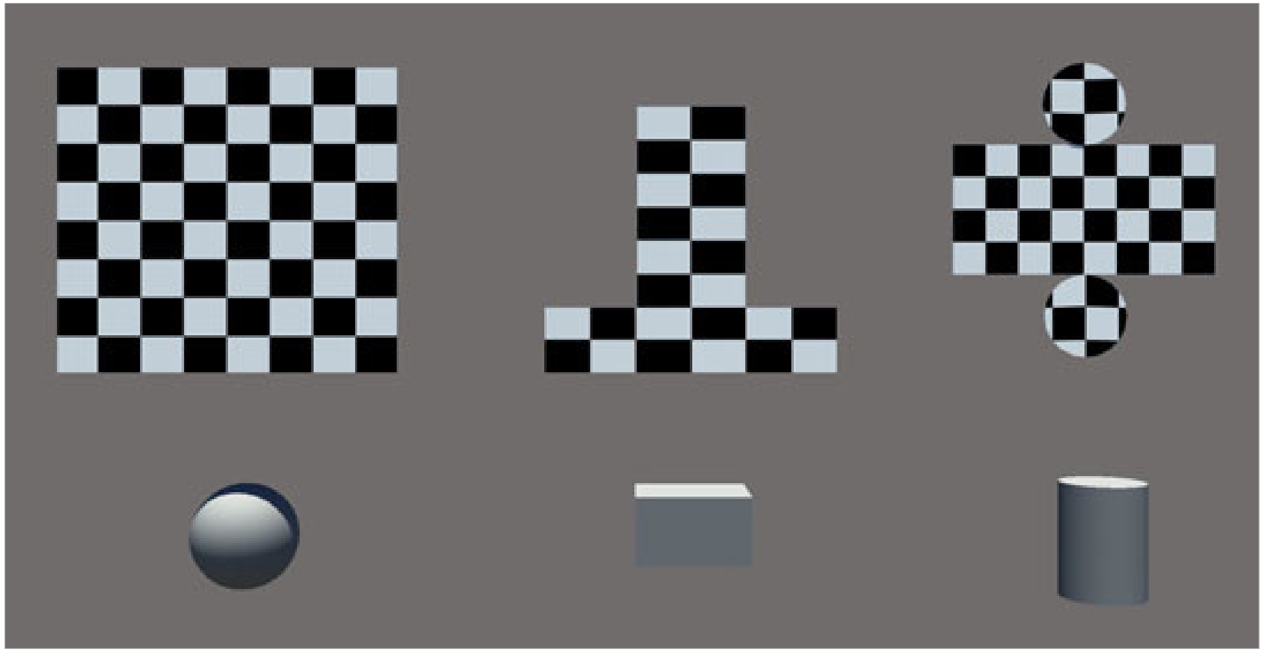

In Maya, to see how exactly the UV mapping is done, you will have to look at the UV texture Editor.

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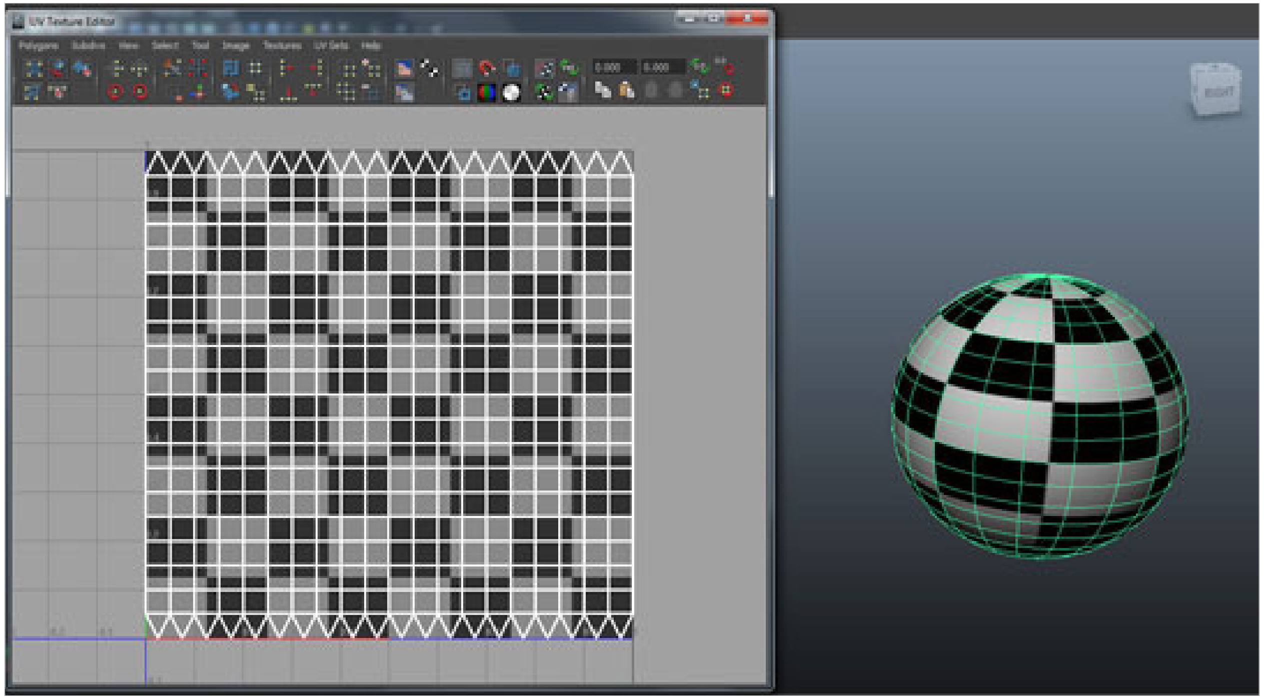
UV Texture Editor

Familiarise yourself with the UV Texture Editor in the software of your choice. Like Maya, they too will have features that let you see and edit the UV mapping of objects.
(In Maya go to Window->UV Texture Editor)

The window will show you how the UV mapping of the selected object has been done.

For the sphere, you can see that all the vertices are opened up to make a rectangle that covers the entire texture map.



For the Box, the faces are opened up like a paper carton.

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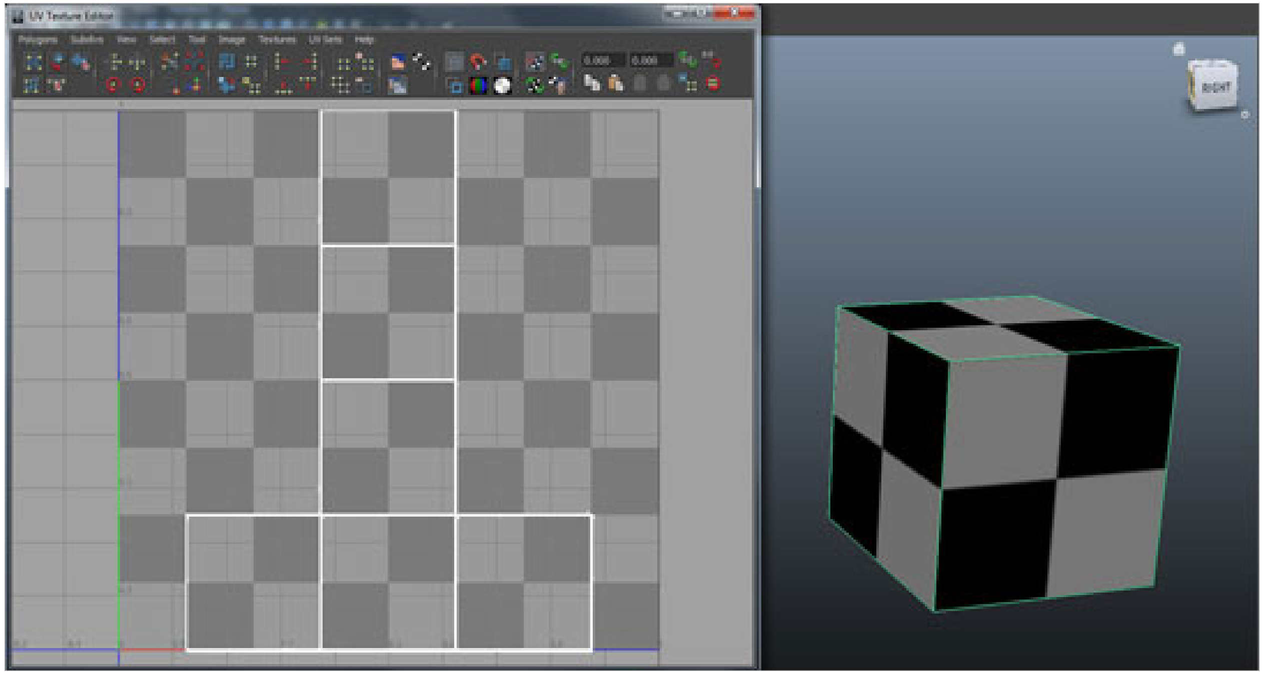

In the case of the Cylinder, the cylindrical surface is opened up and the top and bottom surfaces are rotated so that all the surfaces are now laid out flat onto the texture.

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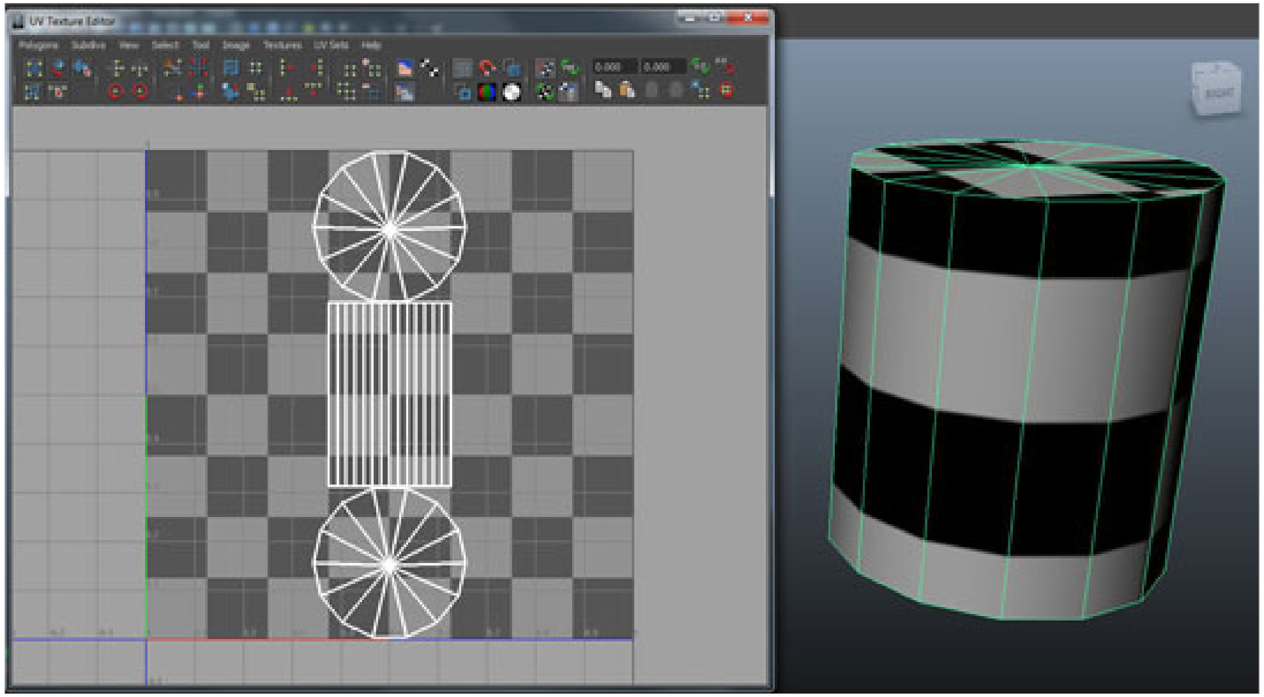

So, instead of the checker box, if we were to use textures matching the corresponding uv mapping, like the earth map for the sphere, the texture for a carton of milk for the cuboid, and that of a soft drink for the cylinder, you will see these textures accordingly in the viewport.

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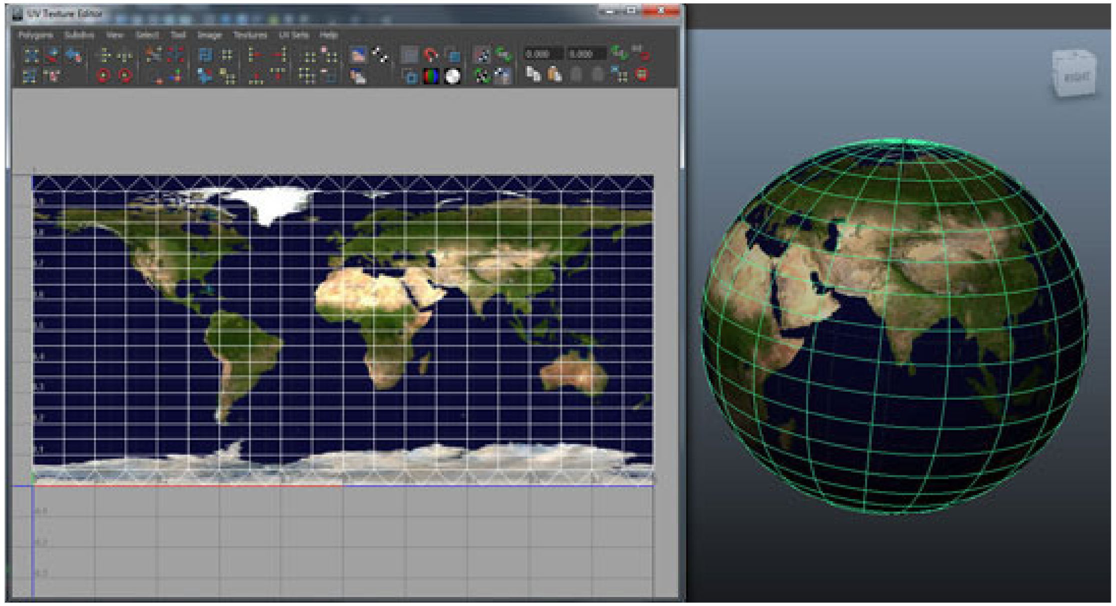
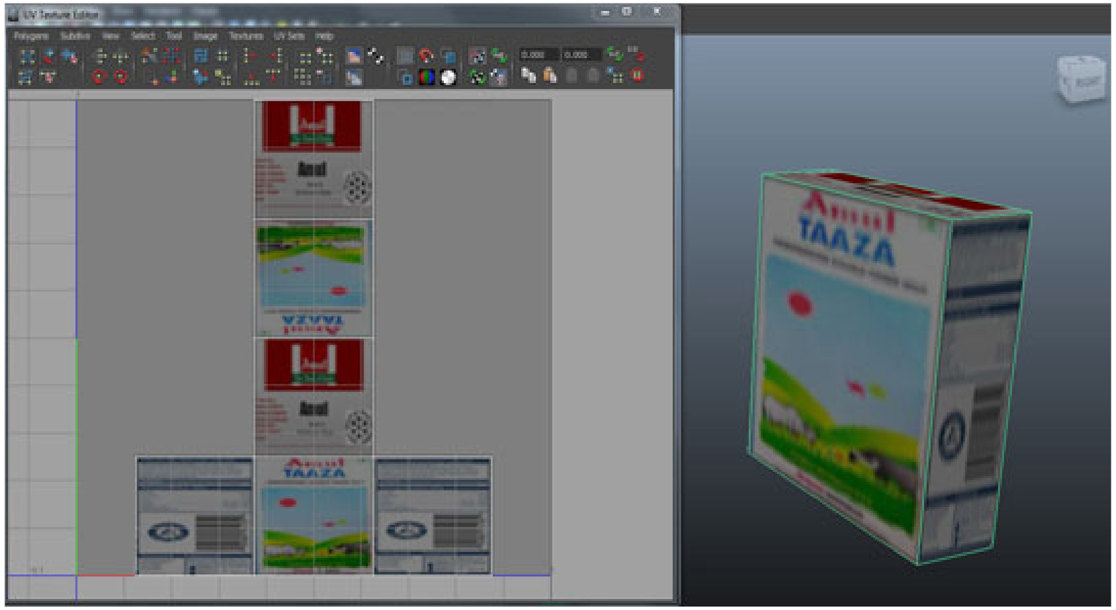
Earth



Milk Carton



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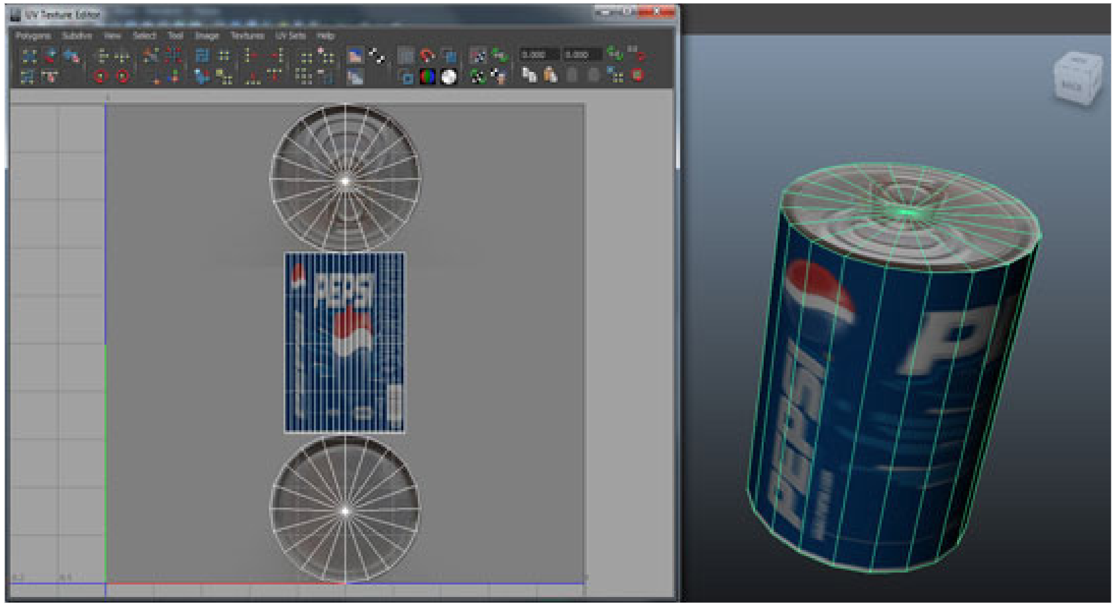
Soft Drink Tin Can



As the name of the window UV Texture Editor says, you can edit this UV map as per your convenience. For now though, it is important to simply understand how it happens.

For the obove examples though, since we used primitive objects, the appropriate UV mapping was created automatically for us by the software. But what about non-primitive objects or if you needed to have a different type of mapping than what is created by the software?

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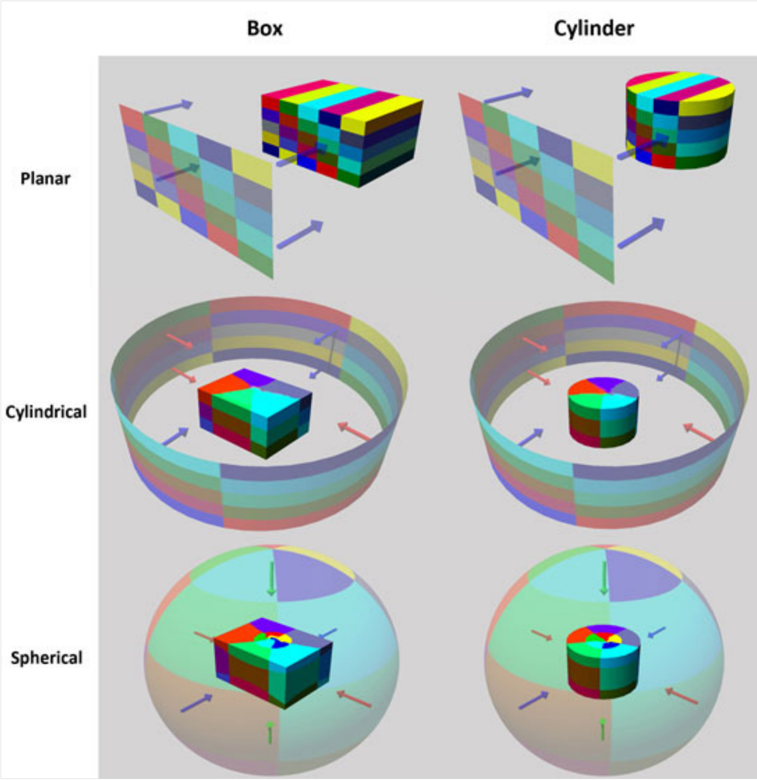
Creating UV Mapping

You can use planar, cylindrical and spherical mapping for other objects too. The difference with this and the above examples is in the way the UV map is created.

Let us take the example of Planar mapping. The object to be mapped does not need to be a plane like the faces of the box. Instead, the image is projected from a plane onto the object to which the mapping is applied.

Given below are the comparisons of the 3 types of mapping for different objects. Study them closely and understand their differences.

Notice how on surfaces curving away from the projection plane or surfaces perpendicular to it, the texture is stretched. Similarly, for Cylindrical Mapping, the texture image is projected inwards from a cylinder onto the object. This can be any object and not necessarily a cylinder and so too for Spherical Mapping.



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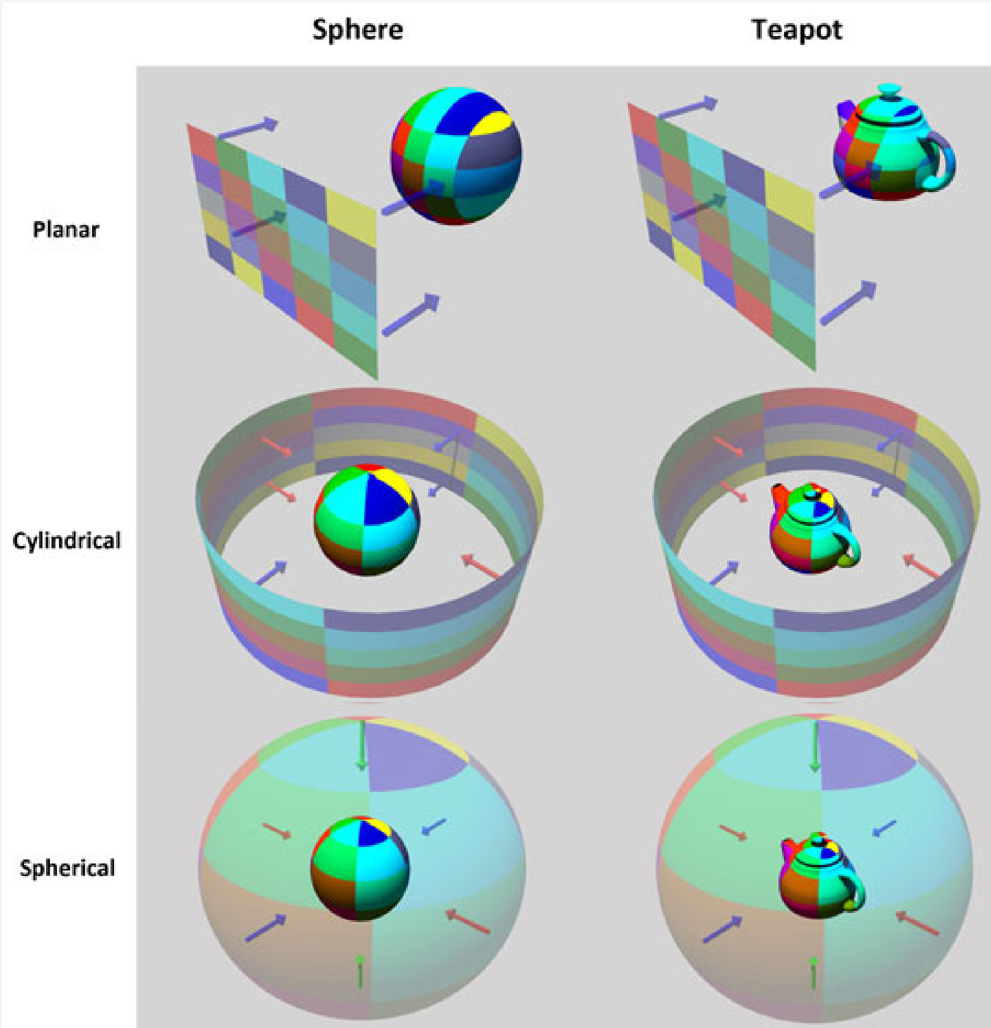

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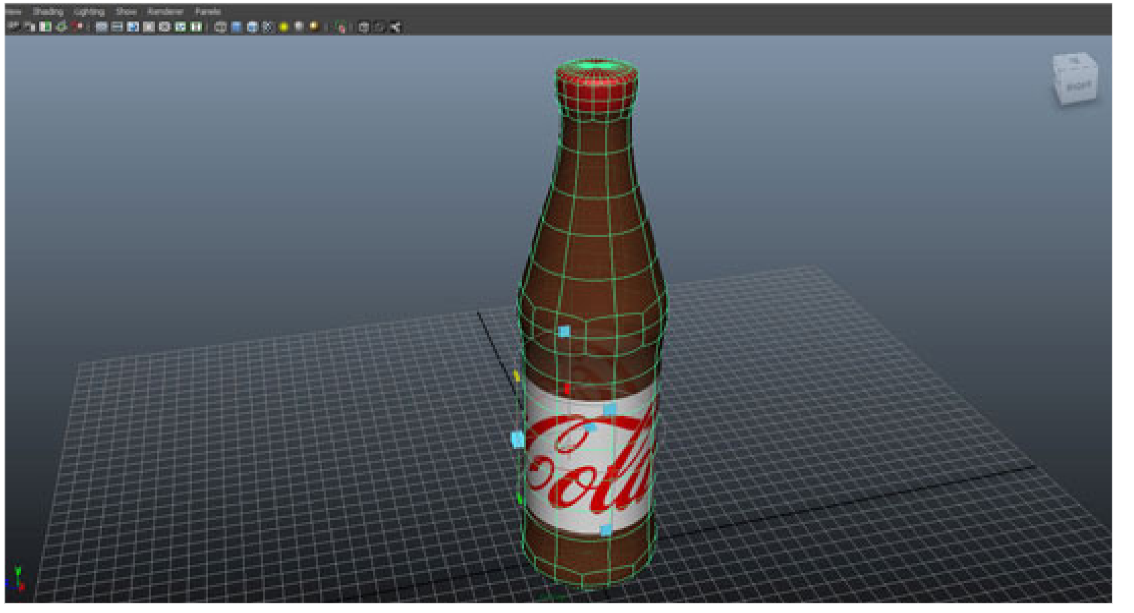
In the bottle example shown in the video, we have created UV mapping for the bottle using Cylindrical Mapping. The label is wrapped or printed around the bottle and a cylindrical map would be quite accurate for it.



Besides texture mapping the colour of the object, there are many surface properties that make the final image created by a 3D software look real. The 'Material' applied to the object will have to recreate all of them. For example, the shininess and glossiness of the surface, the roughness and ups and downs in the surface, transparency, reflection, refraction .... the list goes on.

Observe different surfaces of objects around you and try and identify the different properties of that surface. We will look at this in more detail in the next part.

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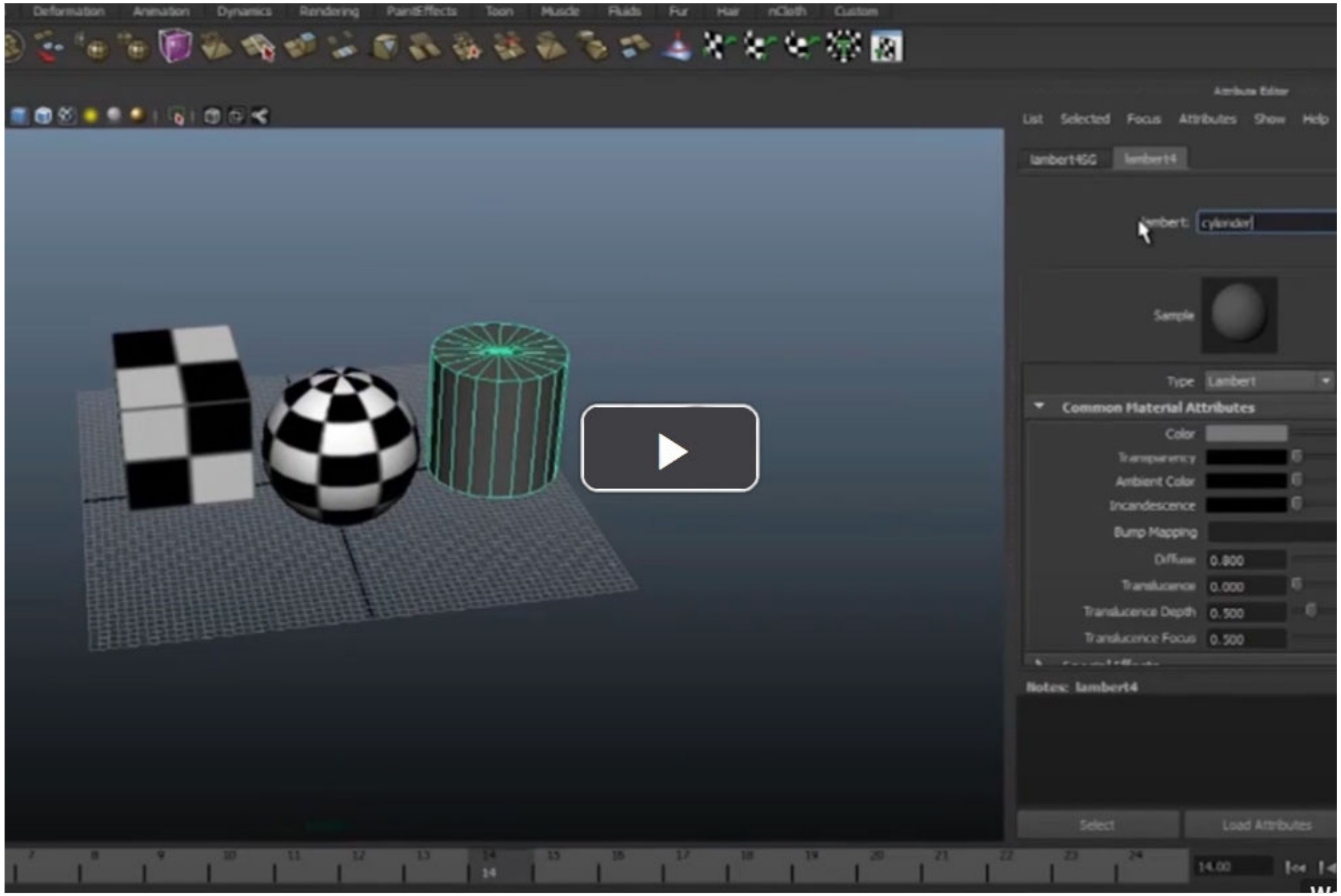
Video



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Contact Details

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