

UV Map & Edit

Cinema 4D Windows Plugin

Manual Version 1.01

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Important Information

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Disclaimer

There is no warranty beyond the legal minimal warranty. In no case, the author shall be liable for any damage on hardware or software caused by using UV Map & Edit.

License

The license is non-exclusive and non-transferable. It is restricted to the usage on a single computer at one time. The usage is bound to a single registered instance of Cinema 4D (identified by the serial number), but may be transferred to upgrades of this registration.

Known Problems

There is a known problem with the interactive UV mapping tool. Cinema 4D might freeze when using the menu or handles in the editor view. This problem was reported from users of Cinema 4D 9.6 only and seems to exist on some systems only. It happens due to a problem in Cinema 4D when updating the values in the Active Tool tab. If you have this problem, uncheck Synchronize values for the interactive UV mapping. Then, Cinema 4D will no longer freeze, but you have to update the values yourself by pressing Refresh after you changed parameters with the menu or handles in editor view.

1. Overview

UV Map & Edit is a powerful plugin to do UV mapping and editing inside of Cinema 4D. It consists of three tools. The interactive UV mapper applies standard mapping methods with many control options to an UVW tag. The UVW object allows detailed editing of an UVW tag with the editing tools of Cinema 4D. The UV draw tool draws complete or partial UV maps colored by polygon selections in the picture viewer.

1.1. Quickstart

After installing the plugin, you will find a new entry UVMapEdit in the Plugins menu of Cinema 4D. This new entry contains three commands: Create UVW Object, Draw UV Map, and Interactive UV Mapping.

For UV mapping, you need a polygon object. Usually, it will already have an UVW tag. First, create an UVW object for this tag. This object displays the current UVW coordinates. You can use the Interactive UV Mapping to create a different UV mapping. For detailed mapping, modify the UVW object as you do with any other polygon object. Finally, you can create UV maps by drawing them in the picture viewer using the Draw UV Map tool.

1.2. UV, UVW, and Materials

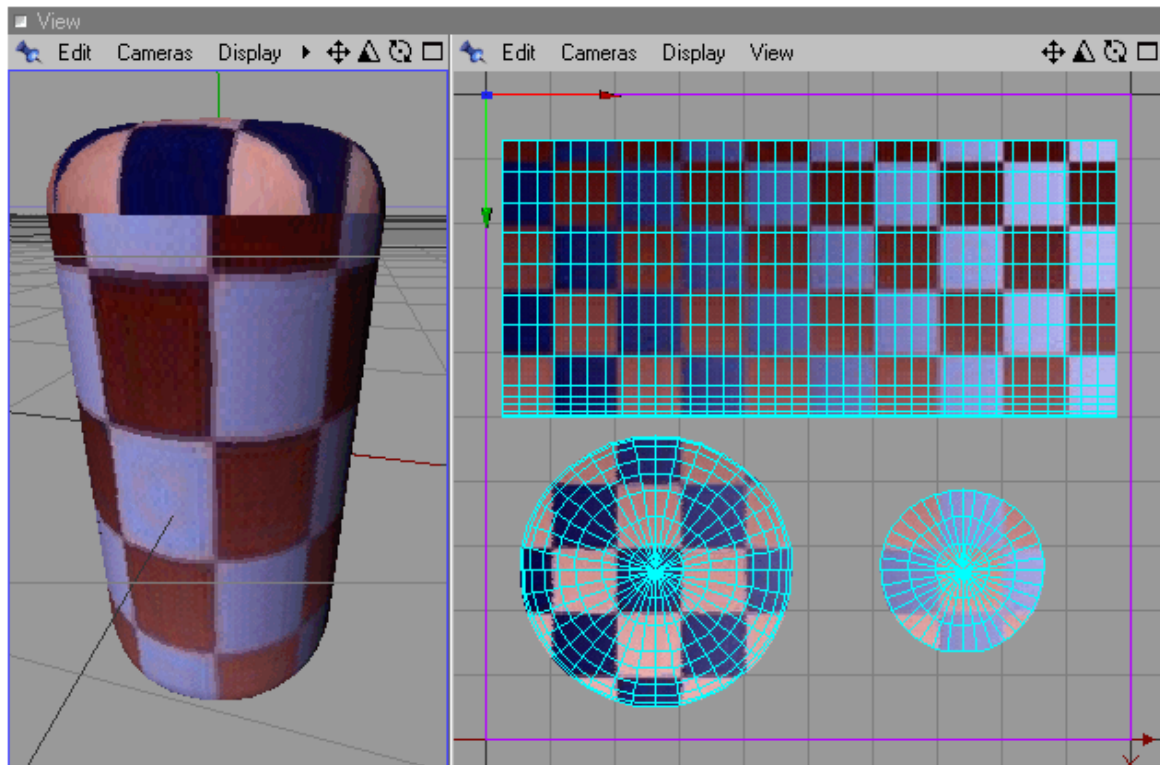
The UVW coordinates determine how a material is placed on the surface of the object. Since most materials are 2D, the W part is 0 in most cases. That's why the UVW mapping is often just called UV mapping.

2. Create UVW Object

Create UVW Object creates an editable polygon object from an UVW tag. It is applied to the selected UVW tag, or to the first UVW tag of the selected object. The object with the UVW tag must be a polygon object. If the selected polygon object has no UVW tag, a new one is created with the object itself as UVW mapping. The new object is inserted after the original object and has the same name with .uvw appended. You can edit the UVW object like any other polygon object. All changes to the UVW object are mapped to the original UVW tag.

Note: The UVW object is meant to be used as a temporary object to do UVW editing. If you do any changes to the original object or to the UVW object that changes the number of points or polygons, the connection between them will no longer work.

2.1. The UVW Object



The UVW object is an editable polygon object. It has one polygon with the UVW coordinates for each polygon in the original object. The polygons don't share any points, you can modify each polygon independent of all others.

When the UVW object is created, the UVW tag and all polygon selection and texture tags are copied from the original object. In addition, an UVW object tag is inserted that links the UVW object to the UVW tag from which it was created. You can move and copy this tag, but in any case it will only interconnect the objects and tags it was created for.

The UVW object is scaled by 100 and turned upside down using a negative scaling for the Y axis. This is done because UV values usually are within a range from 0 to 1 and unlike for the 3D view, 0 is the top and 1 the bottom.

The best way to work with the UVW object is to split the view to a panel with a 3D camera for the original object and a panel with a front camera for the UVW object as shown in the image above.

You can use any material for the UVW object. I included a material that uses a checker to mix a horizontal and a vertical gradient. The checker helps you to detect distortions, and the gradients help to locate the mapping.

2.2. The UVW Object Tag

Since the UVW object is just a polygon object, all functionality of it is done by the UVW object tag. It forwards all changes in the UVW object to the UVW tag. In addition, it provides several tools to facilitate the UV editing. Besides the Basic tab, there are four custom tabs: Synchronize, Frame, Tools, and Colorize.

Synchronize

With synchronize, you can transfer several states between the UVW object and the UVW tag.

If UVW is checked, all changes in the UVW object are immediately applied to the UVW tag. This gives a live preview of all UVW changes in real time on the original object. You can turn this off e.g. if performance is too slow for objects with many polygons. You can also apply the current state of the UVW object to the UVW tag by pressing the Set button right to the UVW checkbox.

You can transfer the selection and visibility states between the UVW object and the original object. The Get button transfers the selection or visibility from the original object to the UVW object. The Set button transfers the selection or visibility from the UVW object to the original object.

Frame

The violet frame around the UVW object marks the area from 0 to 1 in x and y direction. Usually, the UV map should be completely inside of this area.

You can turn the frame off, use a 2D frame for UV or a 3D frame for UVW mapping. You can select any color for the frame. With offset and size, you can move and scale the frame.

Tools

With the Weld tool, you can bring or keep together points in the UVW object if they are mapped to the same point in the original object. This is useful to prevent holes in the UV map. The tolerance is the maximum distance between points to weld in 1/100 unit.

With the Weld all button, all points are welded according to the current tolerance. The Weld selected button welds selected points only.

Note: Unlike other weld tools, this will not join several points into one. The points are just placed at the same position.

If you check Auto weld, points that belong together and that are at the same position are kept together if one of them is changes its position. If you also check tolerant, points that come close enough during editing are welded, which results in a kind of collecting effect.

Press the Fit 0..1 button to move and scale the points of the UVW object to fill the range from 0 to 1. If there is no expansion in one direction (usually this is the case for the W dimension), it is located at 0.

With the Divide by selections button, you can divide the UVW object according to its polygon selection tags in the X-Y plane. Undivide by selections is the reverse effect to put them together again.

The Object as UVW button transforms the original object to be its own UVW mapping, scaled and moved to fit inside the 0..1 cube.

Colorize

With the colorize feature, you can visualize several properties of the UV map that may be of help to optimize it. The brightness of the color shows for each polygon how much the UV map differs from the original mesh in regard to the selected property. An optimal UV map will show the original color for all polygons.

With mode, you can select one of the four properties to visualize:

- **Facet size:** This shows the size of each polygon relative to the overall size. If a polygon is larger in the UV map, the color is brighter. If it is smaller, the color is darker. Unlike the other modes, this is a global property. It visualizes how uniform the UV map is in regard to the size of the single polygons.
- **Edge length:** This shows the length of each edge in a polygon relative to the overall outline. If the relative lengths of the edges differ compared to the original object, the color of the polygon is brighter. Unlike the other modes, this property is dependent on the scaling of the UVW object. This is useful to determine a good ratio when drawing the UV template. With the standard scaling, an optimal map is an unicolored one even if it differs from the base color.
- **Center distance:** This shows the distance for each point of the polygon to its center. The brighter the color of a polygon, the larger is the difference between the relative distance in the original object and the UVW object.
- **Corner angle:** This shows the angle between the two edges of each point. The brighter the color of a polygon, the larger is the difference between the angles in the original object and the UVW object.

Note: If the description of these modes sounds a bit too abstract, simply try the modes for a simple UV map of a plane with four polygons. Move some points and watch how the color changes.

If you check Selected polygons, only the selected polygons of the original object are colorized. For facet size mode, the size is calculated relative to the selected polygons only.

With Contrast, you can change the contrast for colorizing. Higher contrast makes smaller differences visible, lower contrast shows differences that are otherwise outside of the visible range.

You can select any color for the polygons. The selected color is the base color. Since the differences are visualized as brightness, this color should be of medium brightness. You can also set a transparency for the polygons. (Depending on the display mode, there might be only a few visible steps of transparency.)

You can choose to also display edges and select a color for the edges. It makes sense to use the same color for the edges as for the polygons to use the edge color as a reference for the base color.

The colored object may be placed on the original object or to any listed place besides of it. Please note that the colored object uses the same coordinates including scaling and rotation, but ignores any deformers. If the colored object is placed on the original object, you need to add some distance because otherwise both objects interfere.

3. Interactive UV Mapping

The interactive UV mapping tool changes the selected or the first UVW tag of the currently selected polygon object. There are several mapping types and additional options. Several parameters can be modified in the editor view, more parameters can be found in the Active Tool tab.

Note: If you apply the UV mapping tool to an UVW object, the original object is used for mapping. To have the editor camera rotating around the original object, this object is selected. As any selection change, you can undo this, but if you do while the UV mapping tool is active, it will select the original object again.

3.1. Editor Display

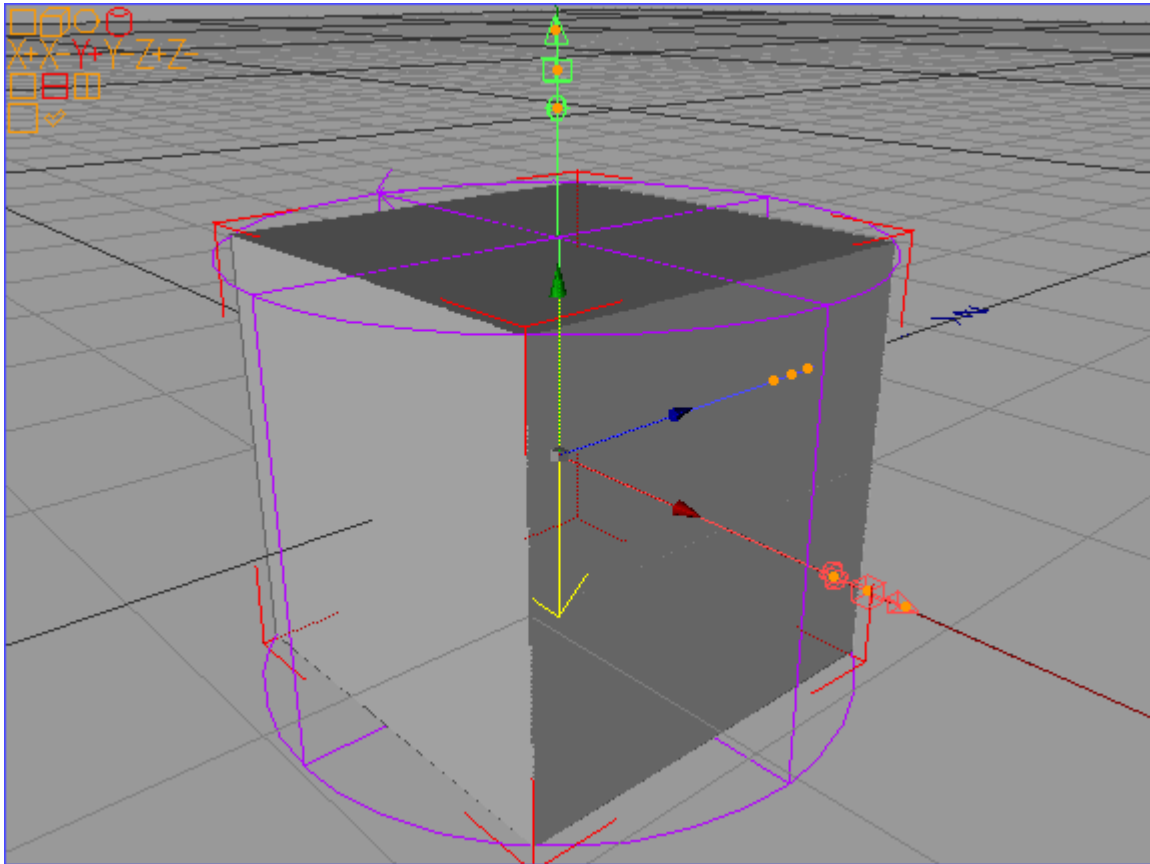
When you select the interactive UV mapping tool, a menu with several icons is displayed at the top left corner of the editor view. The lines of this menu contain the following options:

1. Mapping type: plane, cube, sphere, cylinder
2. Axis: positive X, negative X, positive Y, negative Y, positive Z, negative Z
3. Split mode: no split, horizontal, vertical
4. Update: live update, manual update

The currently selected mode is red. Just click on an icon to change the selection, to activate live update, or to do a manual update.

At the selected object, there is a violet frame with the shape of the mapping type that fits the size of the object. This frame also reflects the position, scaling, and rotation for the mapping. The red, green, and blue arrows mark the X, Y, and Z axis for the mapping. Each has three orange handles. The outer handle is for moving, the middle for scaling, and the inner for rotation. They work the same way as the move, rotation, and scale tools of Cinema 4D. To

scale all three axis at once, click at any point in the view that has no other function. The yellow arrow marks the selected axis, i.e. the view direction.

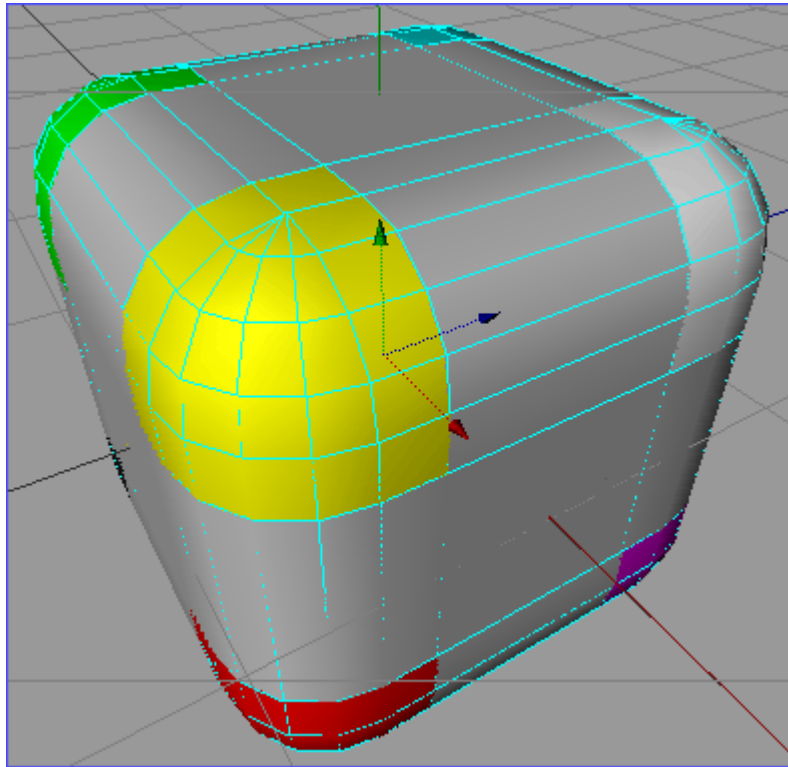


3.2. Mapping Types

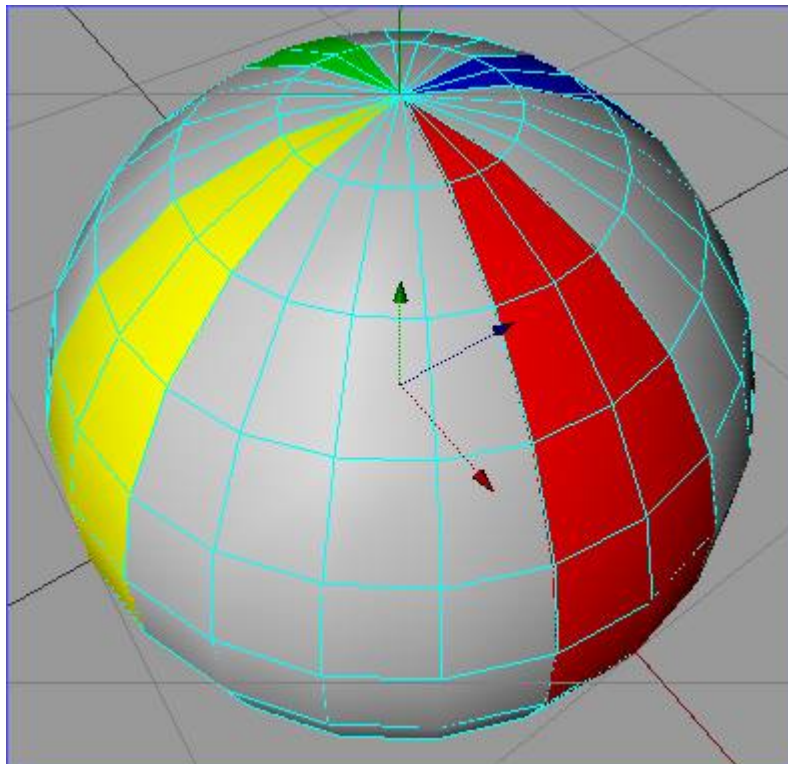
There are four mapping types: plane, cube, sphere, and cylinder. They can be applied along the X, Y, and Z axis, positive and negative. The map can be without split or with horizontal or vertical split. The meaning of the split as well as the three tolerance parameters depend on the mapping type and are explained below.

The axis is actually the view direction. X+ means looking at the object from positive X values to negative X values. Selecting a different axis means to rotate the mapping by 90° or 180° while the mapping still fits the object without need to rescale.

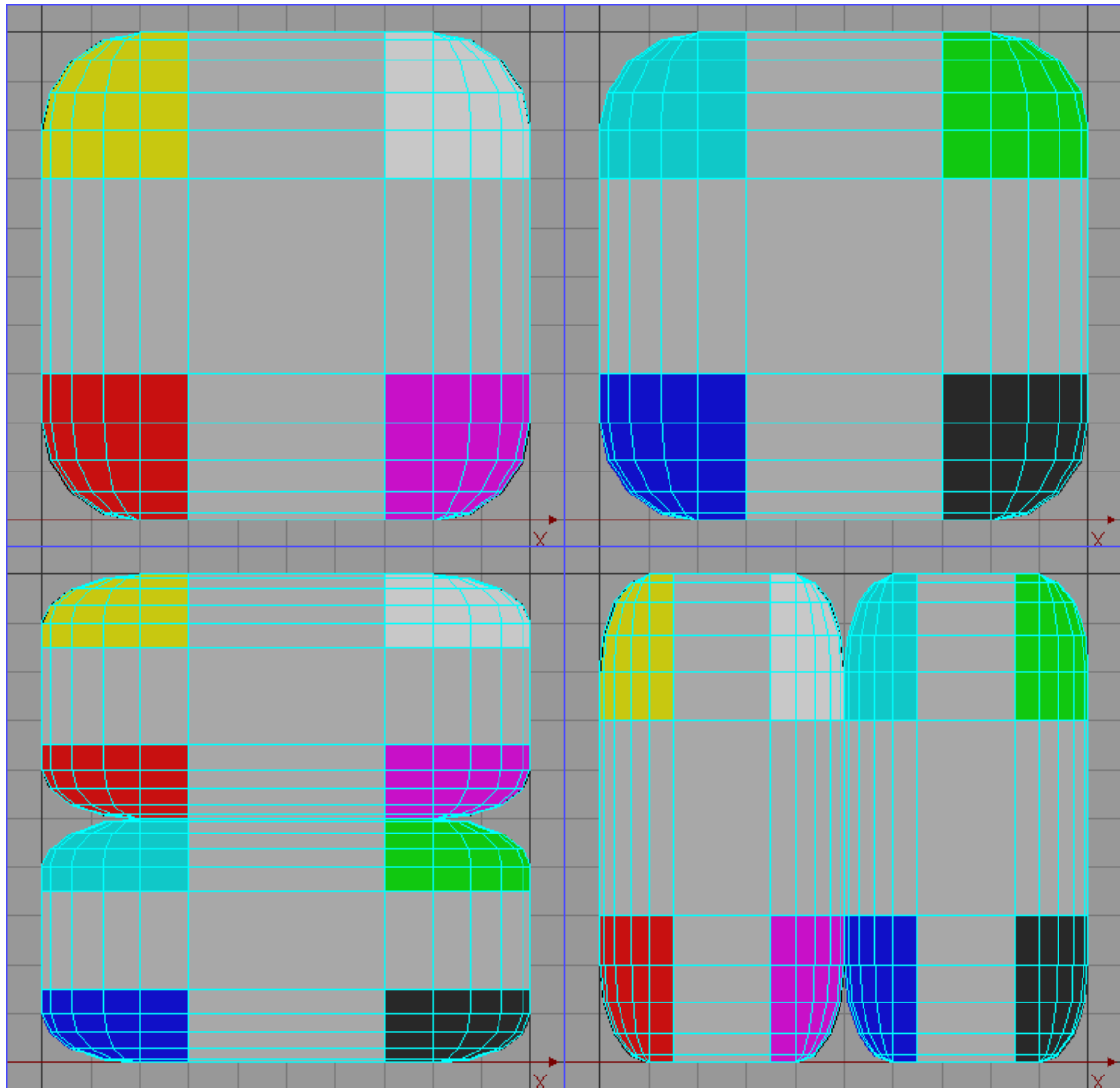
To explain the different mapping types, I will use the following cube. Each corner of the cube has a different color (with R/G/B set to 0 for negative and 1 for positive X/Y/Z axis).



For the sphere mapping, I will also use the following sphere.



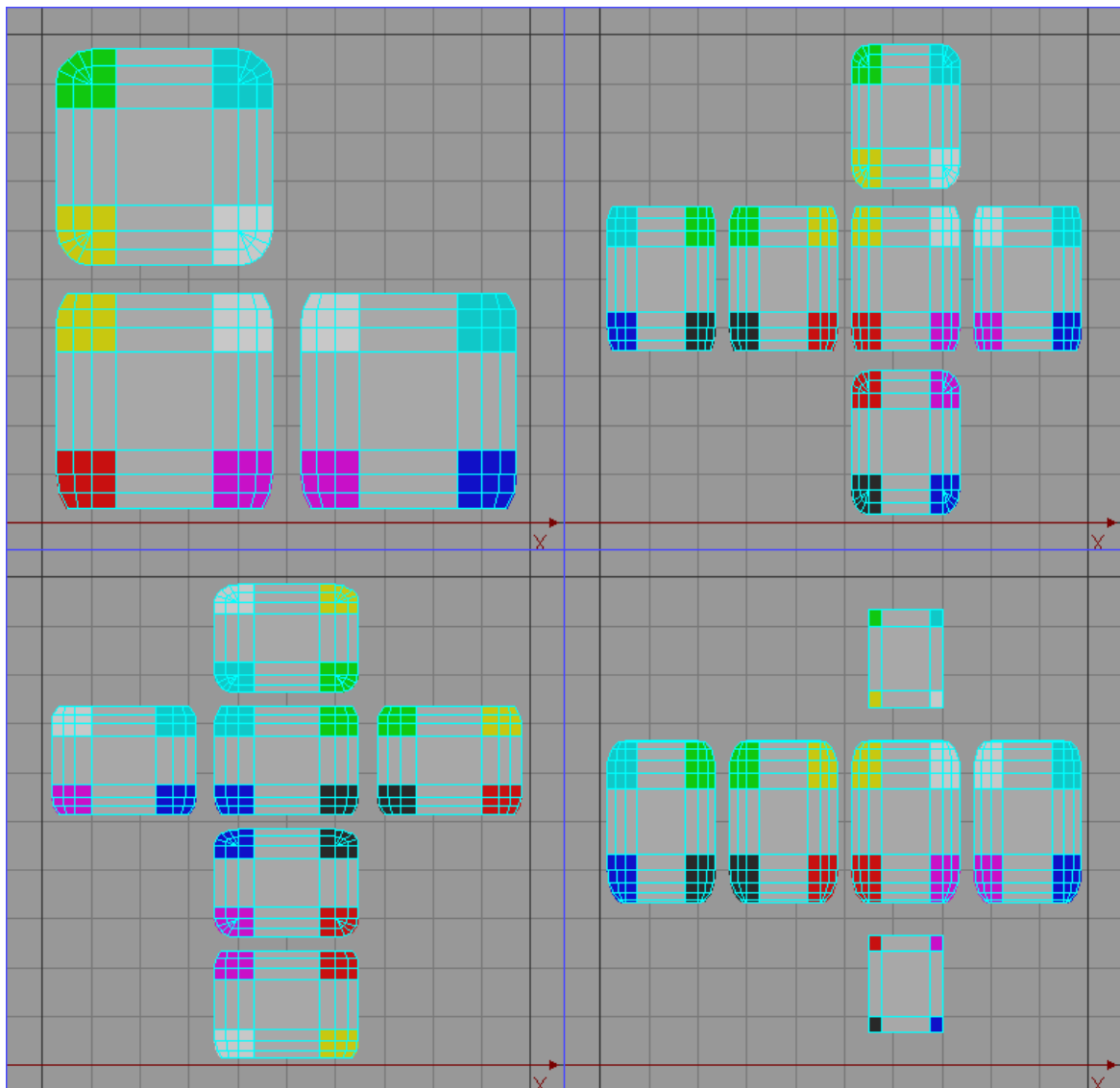
Plane Mapping



The plane mapping is the simplest mapping. It uses the plane orthogonal to the selected axis for mapping and ignores the depth. You can split the mapping horizontally and vertically. The splitting divides the mapping to a front and back view according to the orientation of the polygon normals.

The image above shows the plane mapping from X+, from X-, from X+ with horizontal splitting, and from X+ with vertical splitting.

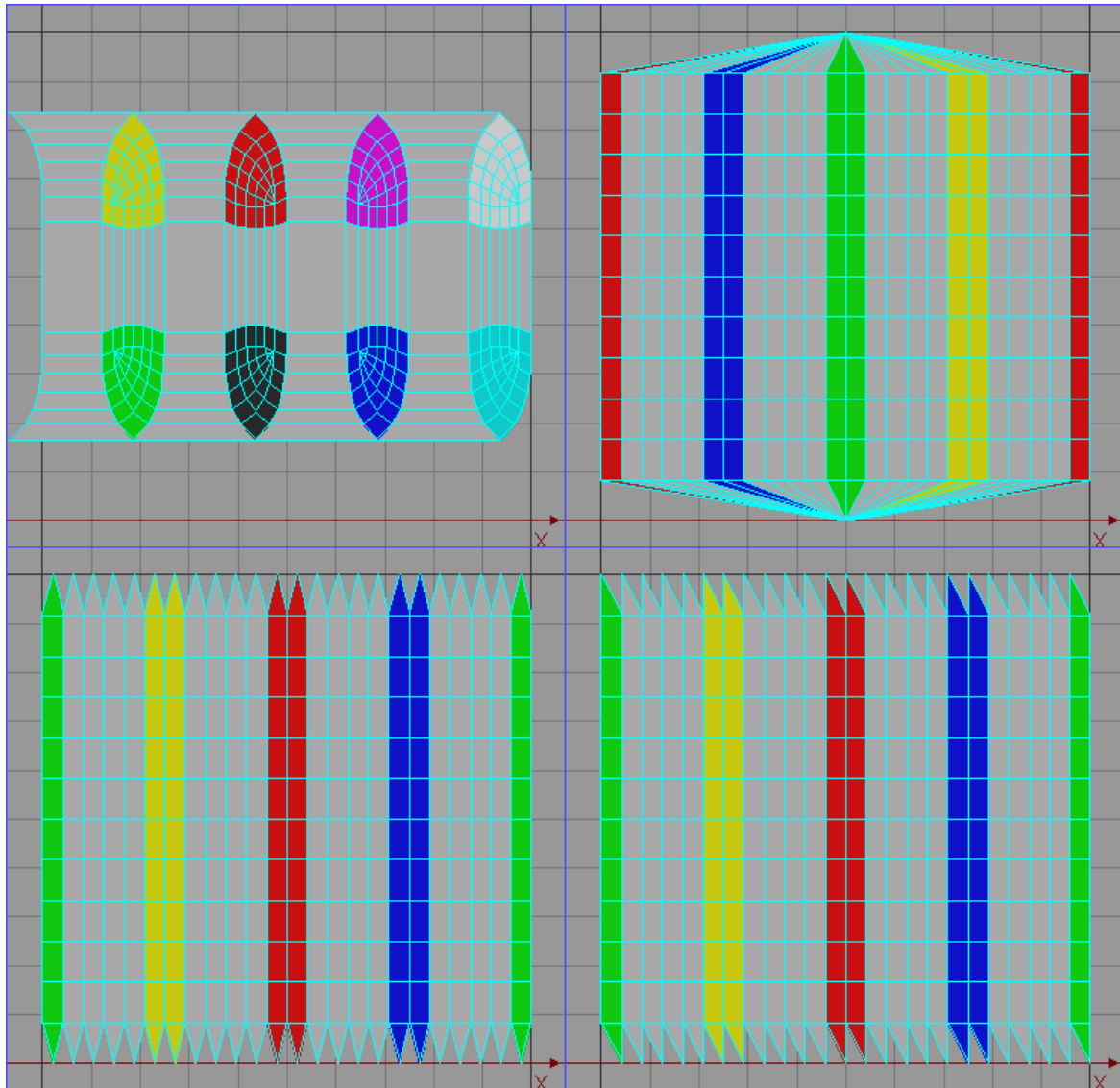
Cube Mapping



The cube mapping also uses a plane mapping, but separate ones for each axis depending on the normal (orientation) of each polygon. The split is made by an angle of 45° , but you can vary this angle for each axis from 0° to 90° using the tolerance parameters. (The tolerance values do not change the angle directly, but kind of scale the object along each axis. Using the same value for each tolerance will result in the same splitting as when using 0 for all.)

The image above shows the cube mapping from X+ without split, from X+ with horizontal split, from X- with vertical split, and from X+ with horizontal split and tolerance 2 set to -100. Without split, the selected axis and its negative axis are both mapped to bottom left. With split, you get the typical cross shape of an unfolded cube.

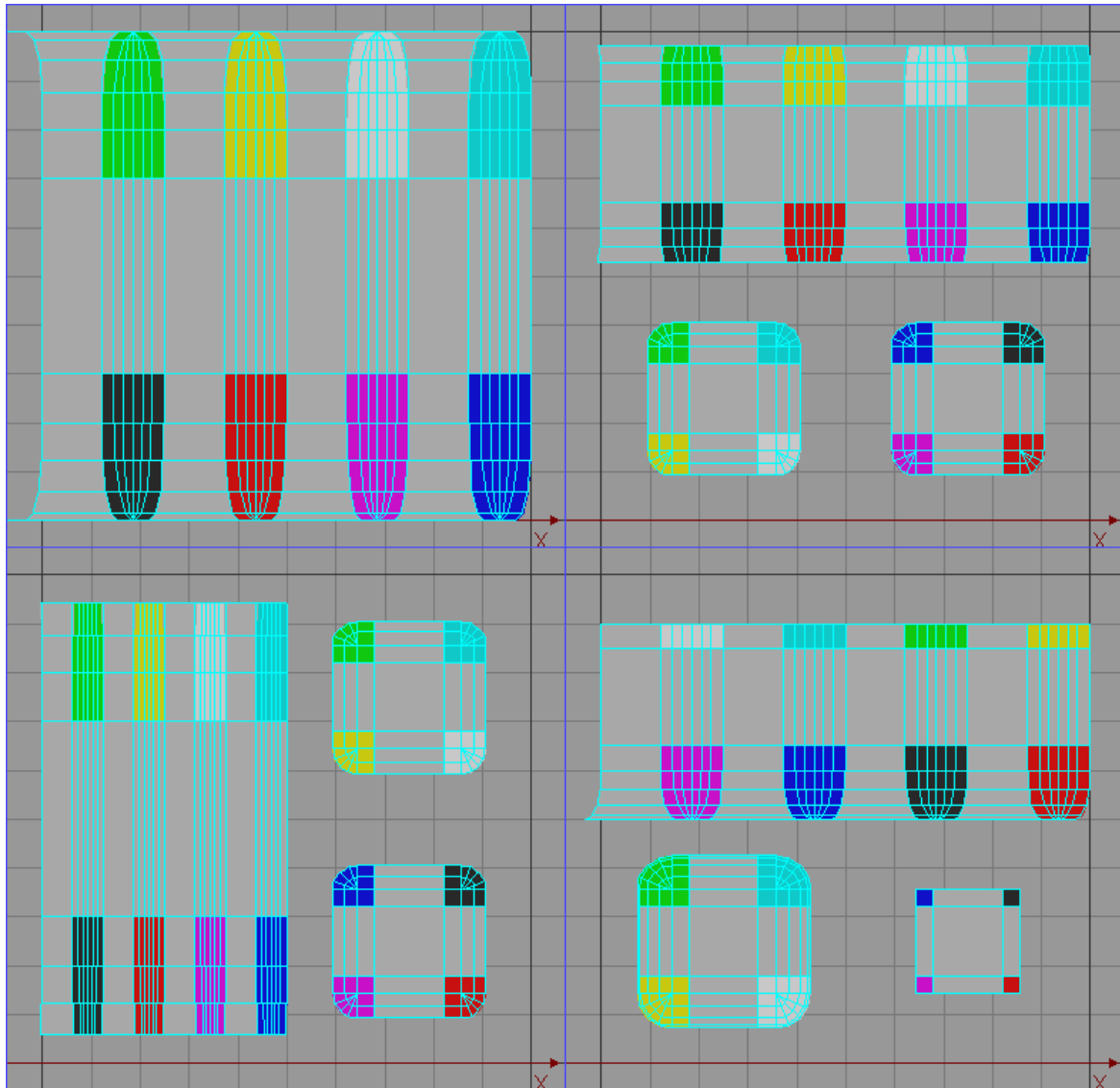
Sphere Mapping



The sphere mapping is based on the angles of the point vector to the main axis (Y value) and on the plane orthogonal to this axis (X value). One of the three circles of the sphere in editor view has an arrow that denotes the counterclockwise unwrapping and where it is split. You can move this split line with the tolerance 1 parameter. The split parameter is used for the X value at the poles (which is mathematically undefined). No split means 0, horizontal split means centered to the previous and following point, and vertical means at the same position as the previous point of the polygon.

The image above shows the cube with sphere mapping from X+, the sphere from Y+ with tolerance 1 set to 50 and no split, with horizontal split, and with vertical split.

Cylinder Mapping



The cylinder mapping is based on the rotation angle around the selected axis. The arrows at the top and bottom circles in editor view denote the counterclockwise unwrapping and the split line. The split line can be moved around the axis with the tolerance 1 parameter. With horizontal or vertical split, a plane mapping is used for the cylinder caps. The split is done by the angle between the normal and the plane orthogonal to the selected axis. The split angle is 45° , but can be varied between 0° and 90° with tolerance 2 for the top and with tolerance 3 for the bottom cap.

The image above shows the cylinder mapping from Y+ without split, with horizontal split, with vertical split, and with horizontal split with tolerance 1 set to 50 and tolerance 3 set to -100.

3.3. Mapping Coordinates

Initially, the mapping is positioned at the center of the object and fit to its size. For sphere and cylinder mapping, the smallest radius is used that encloses the bounding box.

With the mapping coordinates, you can change this position, orientation, and scaling. You can enter the values for position, scale, and rotation in the Active Tool tab, or use the orange handles along the mapping axis in the editor view. The violet mapping frame is adjusted to the mapping coordinates.

Note: Depending on the mapping coordinates, you might get overlappings in the UV map. Change the overall scaling to prevent this. You can also use the scaling to create gaps in the UV map.

3.4. 2D Placement

Usually, the UV is mapped to the area from 0 to 1. (Depending on mapping type and mapping coordinates, the actual UV map might seem to be located elsewhere.) With the 2D placement options, you can change where the UV map is located.

If you select Full area, the area from 0 to 1 is used. By selecting Quadrant, you can subdivide this area in to quadrants and locate the UV map at one of these quadrants. Select Area to explicitly give an offset and size to locate the UV map.

With Gap, you can create a border around the UV map. 0% means no border, 100% reduces the UV map to a point and leaves only border.

With Orientation, you can rotate the UV map around the center and flip it in horizontal and vertical direction and along the diagonals.

3.5. Applying the Mapping

If you select Live update, all changes are applied immediately to the UVW tag or UVW object. Otherwise, press Update to apply the current settings.

Note: For live update, there is only one undo step for everything you do after you turned live update on. Turn it off and on again to create additional undo points.

With the Selected polygons checkbox, you can restrict UV mapping to the polygons that are selected in the object for which UV mapping is done (not the UVW object). Press the Fit to selection button to adjust the mapping coordinates to fit the selected polygons only.

When Synchronize values is checked, changes by the menu or handles in editor view are set in the Active Tool tab. Otherwise, you have to press Refresh to update the values. (This is a workaround for a problem on some systems, where Cinema 4D might freeze when the values are updated while they are modified using the menu or handles in editor view.)

With Menu in editor, you can hide or show the menu that is displayed in editor view.

4. Draw UV Map

To create a template image for an UV map, select an UVW tag or an object with an UVW tag and select Draw UV Map from the plugins menu.

In the options dialog, you can set the output width and height for the image. Since an image is 2D, the W coordinate is always ignored. If you check filled, the polygons are filled with a lighter color, otherwise only the edges are drawn.

If the object has polygon selection tags, these tags are listed. For polygons that are in no selection tag, the first entry in the list is named Ungrouped. Check those selections that should be included in the UV image. You can also set a color for each group.

The buttons below the selection list allow quick selections. You can select all, none, all tags with materials, or all groups (tags without materials). You can set all colors to black or to the default color.

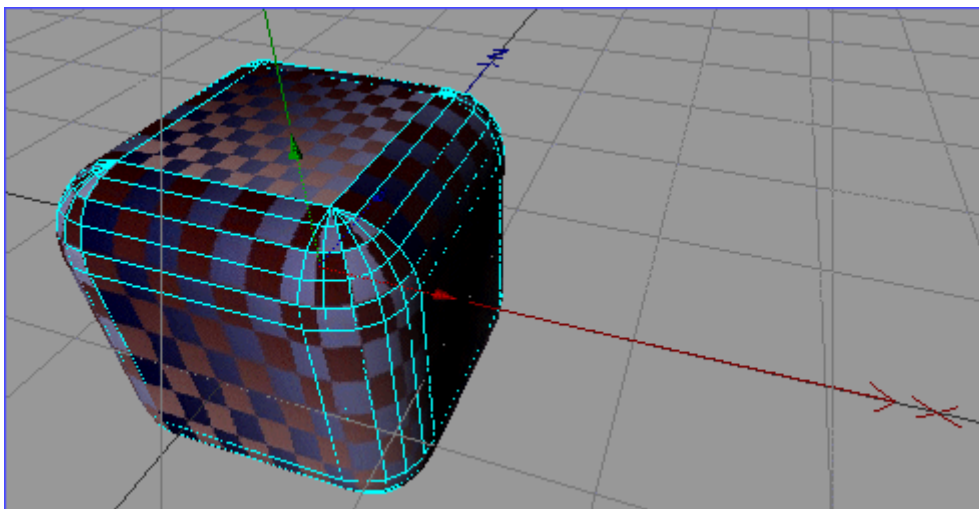
When you press OK, the UV image is drawn and displayed in the picture viewer. There, you can save it like any other image.

5. Tutorial

This small tutorial gives you an introduction to UV mapping and editing using the plugin UV Map & Edit. Simply follow the steps as described in the following.

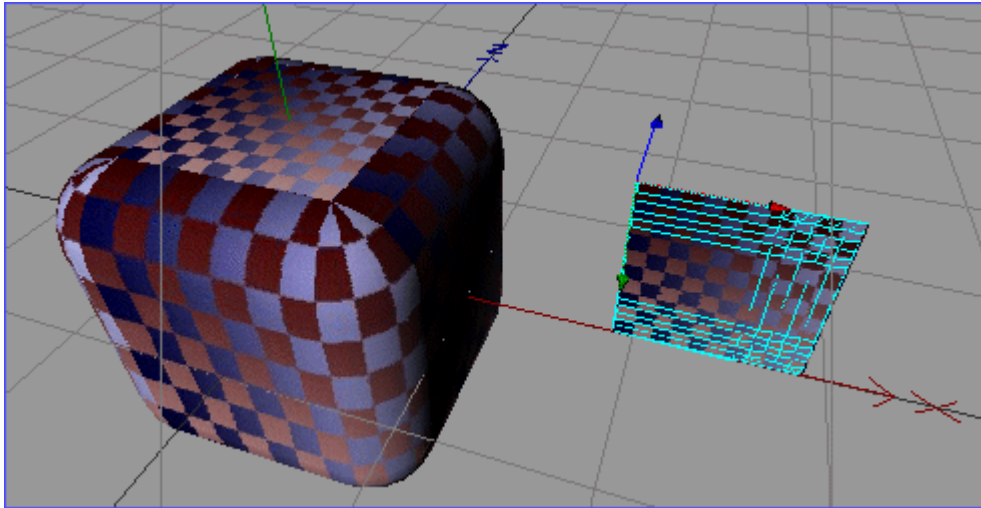
1. A sample object

First, we need a scene with a polygon object. Start with an empty scene and add a cube. Turn on Fillet for the cube to have a bit more interesting object. Convert the cube to an editable polygon object. Apply the included checker texture.



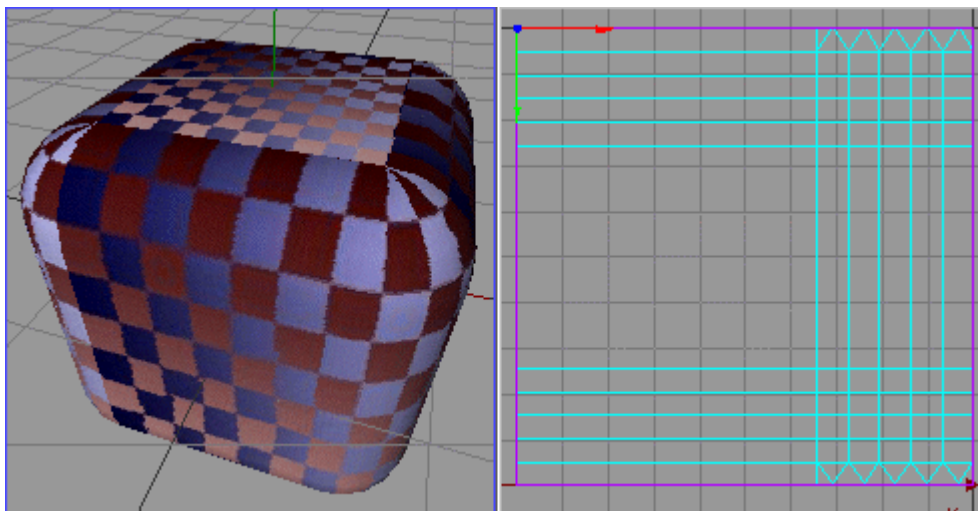
2. The UVW object

Create an UVW object for the cube to see the UV mapping. Move it to the side of the cube until they don't overlap.



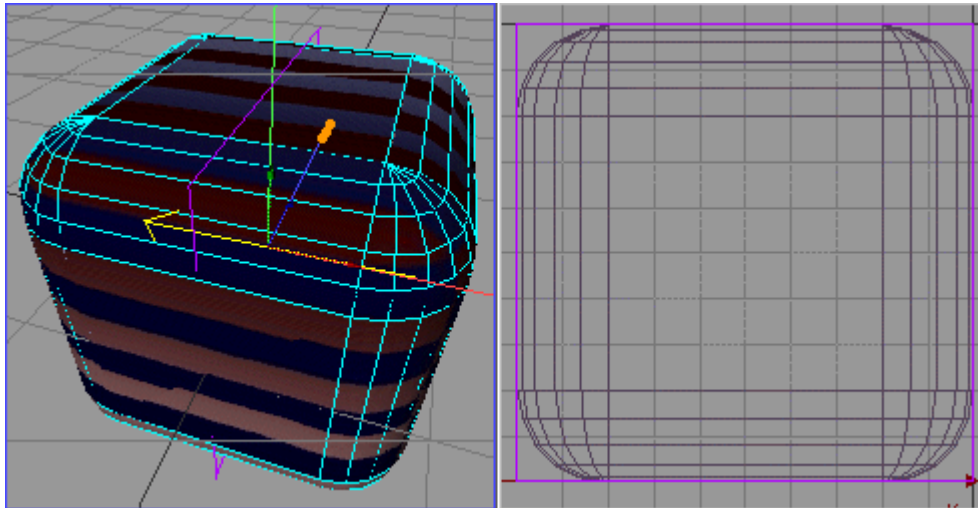
3. Workspace for UV mapping

Devide the workspace into two views side by side. The left side will be for the cube and has the usual 3D perspective view with shaded display. On the right side, use a front view with wireframe and focus on the UVW object. (For C4D 9 and up, you can also use shaded display with lines on both views to see both the texture and the mesh.)



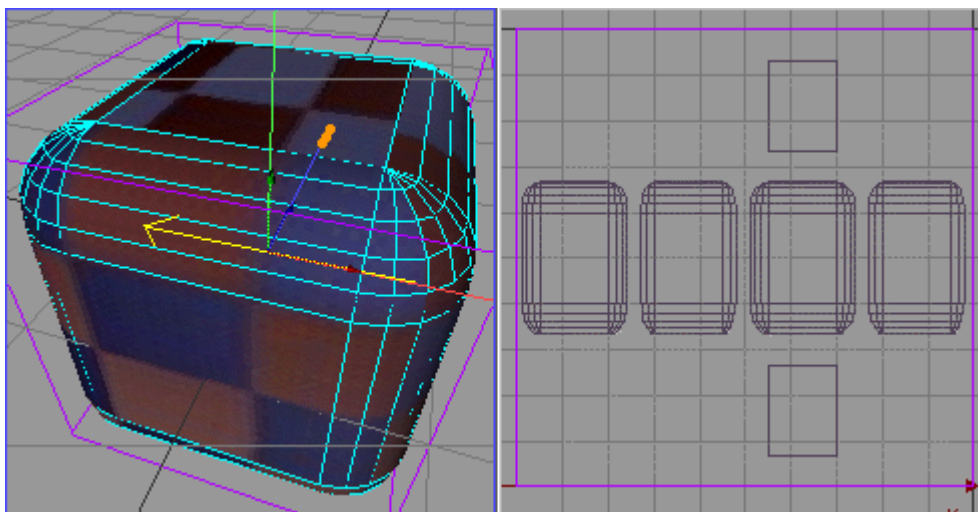
4. Interactive UV mapping

Now, select the UVW object and start the interactive UV mapping tool. The cube will become the selected object, so you can rotate around it in the left view to see the result of UV mapping. Turn on Live update to apply any changes immediately.



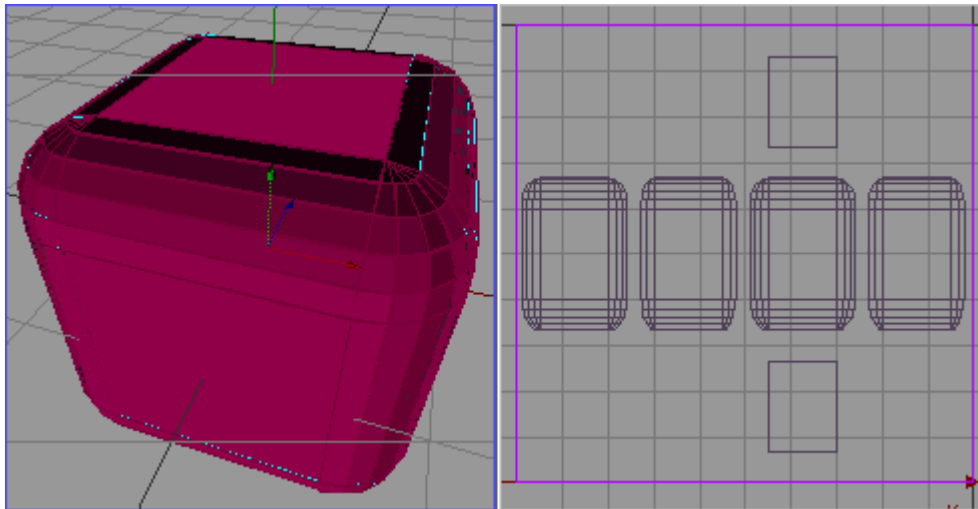
5. Selecting the mapping

Try the different mapping, axis, and split modes. Obviously, a cube mapping for the X+ axis and a horizontal split is a good selection, so we will keep it. Because the Fillet uses a rotation around Y, we reduce the mapping for Y to the top and bottom polygons by setting Tolerance 2 to -100. Select the Move tool to end interactive UV mapping.



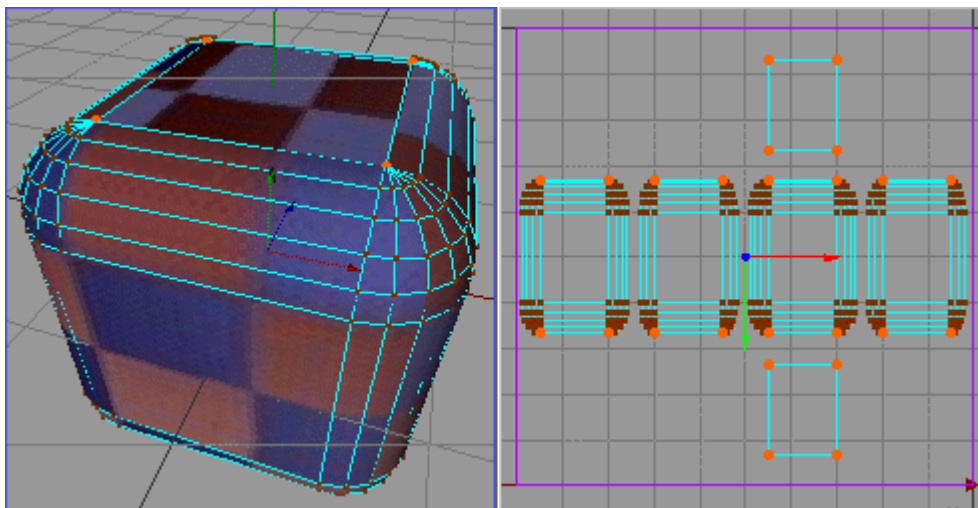
6. Analyzing the UV map

Select the UVW object tag and go to the Colorize tab. Turn on the Facet size mode. In particular the polygons adjacent to the top and bottom rect are very dark, which means that their size in the UV map is too small.



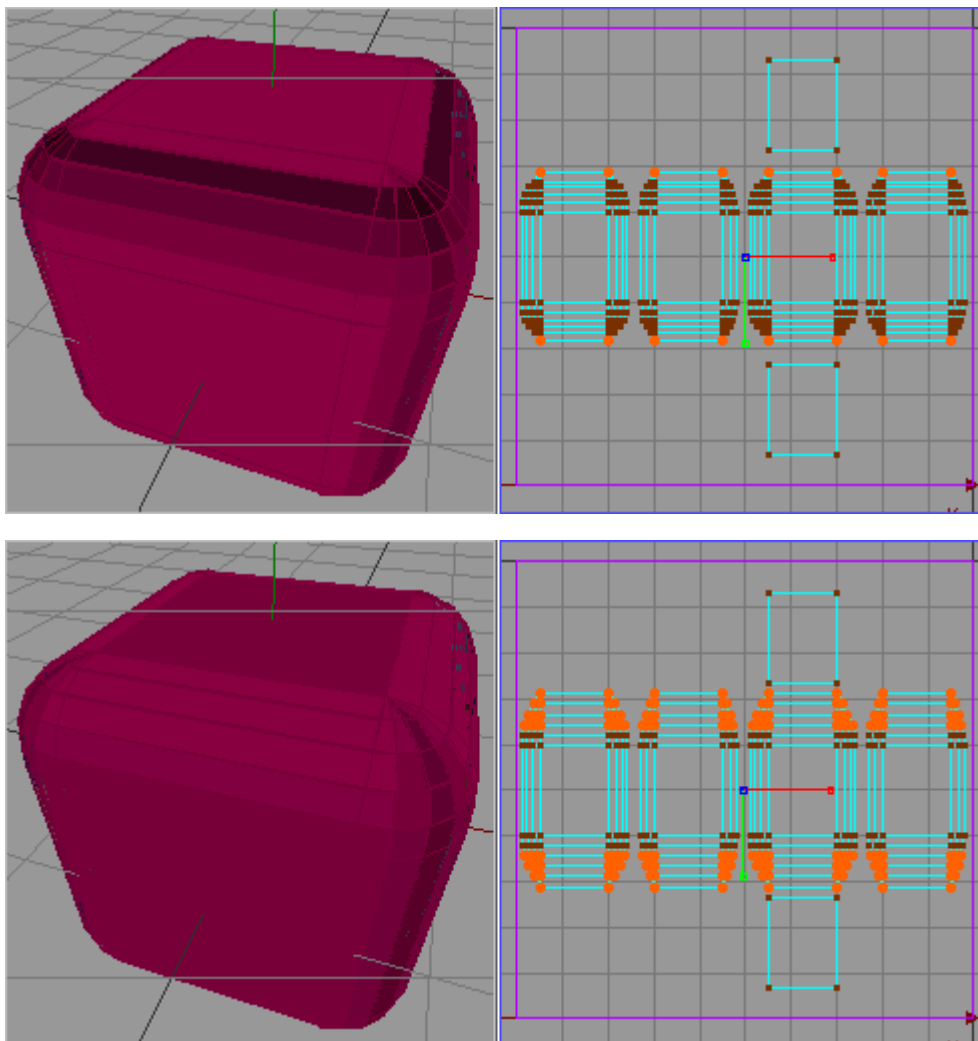
7. Transferring selections

In point mode, select the points of the top and bottom polygon of the cube. Select the UVW object, go to the UVW object tag, select the Synchronize tab, and press Get for point selection. Now, the according points are selected in the UVW object.



8. Optimizing the UVW map

Since we don't want to change the UV map for the top and bottom polygons, unselect these points. Use the scale tool and scale the selected points in the UVW object along the Y axis until the polygons have the same color as top polygon. Add the next line of points to the selection and scale again. Repeat until all rows of polygons have about the same color.



Note: Using scale instead of move here is a trick to apply the change to top and bottom symmetrically at once. But it is a bit imprecise because the scaling is applied again to polygons that were already optimized.