

UVW Mapping

Most material maps are a 2D plane assigned to a 3D surface. Consequently, the coordinate system used to describe the placement and transformation of maps is different from the X, Y, and Z axis coordinates used in 3D space. Specifically, mapping coordinates use the letters U, V, and W; the three letters preceding X, Y, and Z in the alphabet.

The U, V, and W coordinates parallel the relative directions of X, Y, and Z coordinates. If you look at a 2D map image, U is the equivalent of X, and represents the horizontal direction of the map. V is the equivalent of Y, and represents the vertical direction of the map. W is the equivalent of Z and represents a direction perpendicular to the UV plane of the map.

You may address why you need a profundity organize like W for a 2D plane. One explanation is on the grounds that it's occasionally valuable to have the option to flip the direction of a guide, comparative with its geometry. To do this, you need the third facilitate. The W organize likewise has a significance for 3-dimensional procedural materials.

Maps and Mapping Coordinates

Mapping arranges determine how a guide is put, situated, and scaled onto geometry. Mapping organizes are regularly indicated as far as U, V, and W, where U is the horizontal dimension, V is the vertical measurement, and W is the optional third dimension, specifying depth.

In general, geometric primitives have mapping coordinates applied by default, but surface objects such as Editable Poly and Editable Mesh require you to add mapping coordinates to them.

If you apply a material with maps to an object that has no mapping coordinates, the renderer displays a warning.

3ds Max provides a number of ways to generate mapping coordinates:

- When you create a primitive object, use the Generate Mapping Coords option. This option, which is on by default for most objects, provides mapping coordinates automatically with a projection appropriate to the shape of the object type.
- Mapping coordinates require additional memory, so turn the option off if you don't need them.

Apply the [Unwrap UVW modifier](#). This powerful modifier offers a wealth of tools and options for editing mapping coordinates.

- Apply a UVW Map modifier. You can choose from several types of projection; customize the placement of the mapping coordinates on the object by positioning a mapping gizmo; and animate the transformations of the mapping coordinates.

Projections Types of UVW Mapping

Set an appropriate projection type for the geometry:


- **Box projection** places a duplicate of the map image on each of the six sides of a box.
- **Cylindrical projection** wraps the map image once around the sides of an object (duplicate image are also projected onto the end caps).
- **Spherical projection** wraps the map image once around a sphere, gathering the image at the top and bottom.
- **Shrink-wrap projection** is also spherical, but truncates the corners of the map and joins them all at a single pole, creating one singularity instead of two.
- Use special mapping coordinate controls for special objects. For example, the Loft object provides built-in mapping options that let you apply mapping coordinates along the length and around the perimeter.
- Apply a **Surface Mapper modifier**. This world-space modifier takes a map assigned to a **NURBS surface** and projects it onto the modified object or objects. Surface Mapper is especially useful for seamlessly applying a single map to a group of surface sub-objects within the same NURBS model. You can also use it for other kinds of geometry.
- There are three cases where you can apply a map without specifying the mapping coordinates:
 - **Reflection maps, Refraction maps, and Environment maps**
 - These use an environmental mapping system, in which the placement of the map is based on the rendered view, and fixed to the world coordinates of the scene.
 - **3D procedural maps** (such as Noise or Marble)
 - These are procedurally generated, based on the local axis of the object.
 - Face-mapped materials

Each facet of the geometry is mapped individually.

You can specify face mapping for the Standard material (see [Shader Basic Parameters Rollout](#)), Raytrace material (see [Raytrace Basic Parameters Rollout](#)), and [Ink 'n Paint material](#).

UVW Map Modifier

By applying mapping coordinates to an object, the UVW Map modifier controls how mapped and procedural materials appear on the surface of an object.

- Select an object. >  Modify panel > Modifier List > Object-Space Modifiers > UVW Map
- Standard menu: Select an object. > Modifiers menu > UV Coordinates > UVW Map
- Enhanced menu: Select an object. > Modifiers menu > UVs, Maps and Materials > UVW Map

Mapping a sphere and a box

By default, primitive objects such as spheres and boxes have mapping coordinates, as do loft objects and NURBS surfaces. Scanned, imported, or hand-constructed polygonal or patch models do not have mapping coordinates until a UVW Map modifier is applied.

If you apply a UVW Map modifier to an object with built-in mapping coordinates, the applied coordinates take precedence if map channel 1 in the UVW Map modifier is used. The Generate Mapping Coordinates option, available during the creation of primitives, uses map channel 1 by default.

You use the UVW Map modifier to:

- Apply one of the seven types of mapping coordinates to an object on a specified map channel. A diffuse map on map channel 1 and a bump map on map channel 2 can have different mapping coordinates and can be controlled separately by using two UVW Map modifiers in the modifier stack
- Apply one of the seven types of mapping coordinates to an object.
- Transform the mapping gizmo to adjust map placement. Objects with built-in mapping coordinates lack a gizmo.
- Apply mapping coordinates to an object with no mapping coordinates, an imported mesh, for example.
- Apply mapping at the sub-object level.

Map Channels

You can control the type of mapping coordinates and the placement of the mapping gizmo for each bitmap in a material that uses multiple bitmaps by assigning explicit map channels to the bitmaps. In the Material Editor you assign each map a different channel number, then you add multiple UVW Map modifiers to the object's modifier stack, each UVW Map modifier is set to a different map channel. To change the type of mapping or gizmo placement for a particular bitmap, you select one of the UVW Map modifiers in the modifier stack and change the parameters. You can change the name of a UVW Map modifier in the Edit Modifier Stack dialog to correlate the modifier to the bitmap.

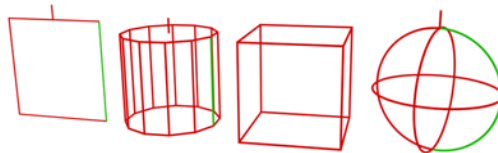
Transforming UVW Map Gizmos

The UVW Map gizmo projects mapping coordinates onto an object. You can position, rotate, or scale a gizmo to adjust map coordinates on an object; you can also animate the gizmo.

Gizmo Display for Different Map Types

For planar, spherical, cylindrical and shrink wrap maps, a short yellow line indicates the top of the map. The green edge of the gizmo indicates the right side of the map. On a spherical or cylindrical map the green edge is the seam where the left and right edge meet. Gizmo must be selected in the modifier display hierarchy to display the gizmo.

Gizmos for different projection types




Planar, cylindrical, box, and spherical

Effects of Transforming the UVW Map Gizmo

Moving the gizmo changes the center of projection and affects all types of mapping. Rotating the gizmo changes the orientation of the map, which affects all types of mapping. Uniform scaling does not affect spherical or shrink-wrap mapping. Non-uniform scaling affects all types of mapping.

Manipulators for UVW Map

The UVW Map modifier has graphic manipulators to help you adjust the mapping dimensions and tiling. To use these, turn on  (Select And Manipulate). The manipulators are available at the main UVW Map level in the modifier stack, and also at the UVW Map modifier > Gizmo level.

There are no manipulators for these mapping types:

- Shrink Wrap
- Face
- XYZ to **UVW**

Tile Controls

Use the UVW Tile controls if you want a map to repeat. Tiled maps are useful for bricks on a wall, or tiles on a floor. Rather than creating one large map, seamless maps can be tiled to surface a large area without visible seams, to give the illusion of a large map.

Tiling in the UVW Map modifier affects only the objects that use this modifier. Tiling a map in the Material Editor affects tiling on all the objects that use the material.

To apply the **UVW** Map modifier:

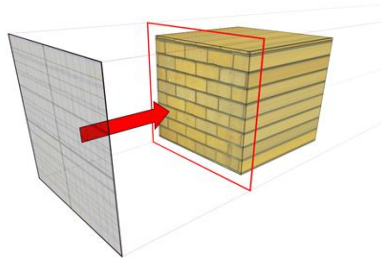
1. Assign a mapped material to an object.
2. On the Modify panel ➤ Modifier List, choose UVW Map.
3. Adjust the mapping parameters.
By default, the UVW Map modifier uses planar mapping on map channel 1. You can change the type of mapping and the map channel to suit your needs. There are seven types of mapping coordinates, ninety-nine map channels, tiling controls, and controls to size and orient the mapping gizmo in the UVW Map modifier.
If a UVW Map modifier is applied to multiple objects, the UVW Map gizmo is defined by the selection, and the mapping that results is applied to all the objects.

Mapping group

Determines the type of mapping coordinates used. Different kinds of mapping are distinguished by how the map is geometrically projected onto the object and how the projection interacts with the object's surfaces.

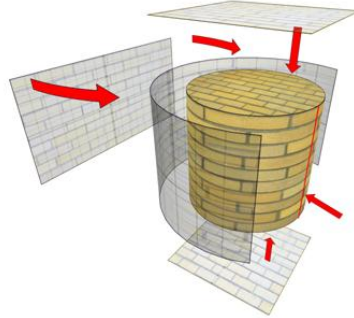
Planar

Projects the map from a single plane flat against the object, somewhat like projecting a slide. Planar projection is useful when only one side of an object needs to be mapped. It is also useful for obliquely mapping multiple sides, and for mapping two sides of a symmetrical object.



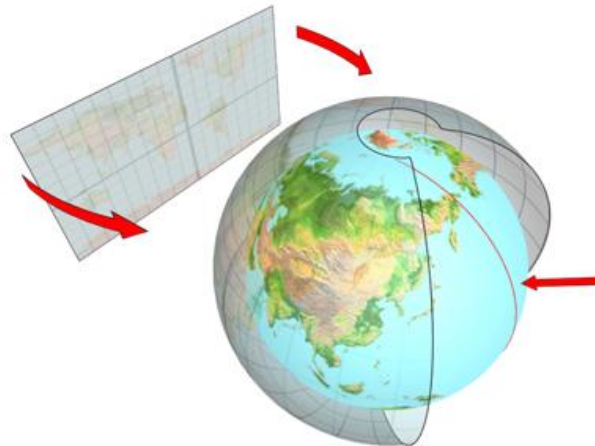
Cylindrical

Projects the map from a cylinder, wrapping it around an object. Seams where the edges of the bitmap meet are visible unless a seamless map is used. Cylindrical projection is useful for objects that are roughly cylindrical in shape.

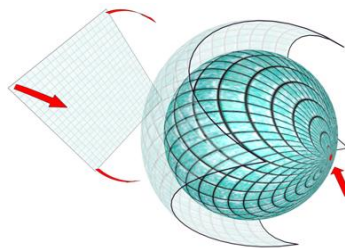


Spherical

Surrounds the object by projecting the map from a sphere. You see a seam and mapping singularities at the top and bottom of the sphere where the bitmap edges meet at the sphere's poles. Spherical mapping is useful for objects that are roughly spherical in shape.

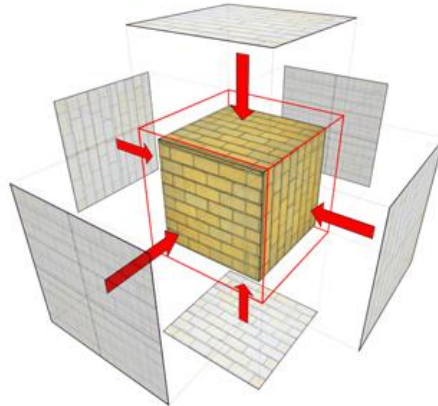


Shrink Wrap:- Uses spherical mapping, but truncates the corners of the map and joins them all at a single pole, creating only one singularity. Shrink-wrap mapping is useful when you want to hide the mapping singularity.



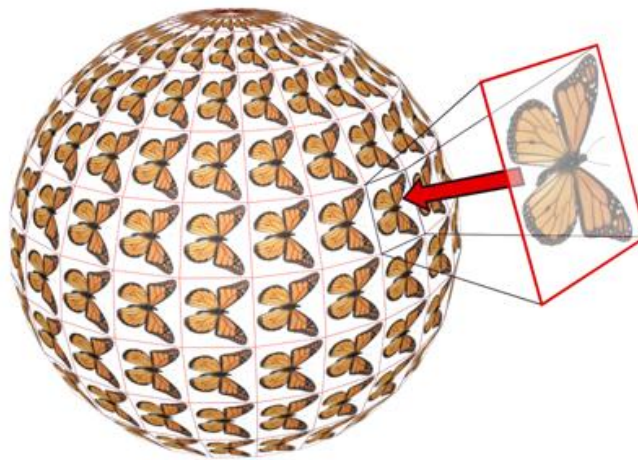
Box

Projects the map from the six sides of a box. Each side projects as a planar map, and the effect on the surface depends on the surface normal. Each face is mapped from the closest box surface whose normal most closely parallels its own normal.



Face

Applies a copy of the map to every face of an object. Pairs of faces sharing a hidden edge are mapped with the full rectangular map. Single faces with no hidden edge are mapped with a triangular portion of the map.



U Tile, V Tile, W Tile

Let you specify the dimensions of the **UVW** map, for tiling the image. These are floating-point values, which you can animate to displace the map's tiling over time.

Flip

Reverses the image about the given axis.

Real-World Map Size

When on, uses real-world mapping for texture-mapped materials that are applied to the object. The scaling values are controlled by the Use Real-World Scale settings found on the applied material's Coordinates rollout. (Both Real-World Map Size and Use Real-World Scale should be either off or on at the same time.) Default = off for 3ds Max, on for 3ds Max Design.

When on, the Length, Width, Height and Tiling spinners are unavailable.