UVW Coordinates

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.

Local UV coordinates shown on a surface

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 might question why you need a depth coordinate like W for a 2D plane. One reason is because it’s sometimes useful to be able to flip the orientation of a map, relative to its geometry. To do this, you need the third coordinate. The W coordinate also has a meaning for 3-dimensional procedural materials

Maps and Mapping Coordinates

Mapping coordinates specify how a map is placed, oriented, and scaled onto geometry. Mapping coordinates are often specified in terms of U, V, and W, where U is the horizontal dimension, V is the vertical dimension, 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.

Decoration on the vase is a map positioned by rotating the UVW Map Modifier gizmo.

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 images 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.

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**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. Mapping coordinates specify how bitmaps are projected onto an object. The **UVW** coordinate system is similar to the XYZ coordinate system. The U and V axes of a bitmap correspond to the X and Y axes. The W axis, which corresponds to the Z axis, is generally only used for procedural maps. A bitmap's coordinate system can be switched in the Material Editor to VW or WU, in which case the bitmap is rotated and projected so that it is perpendicular to the surface.

- 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

**Procedures Interface**

**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.

**NOTE:** Drawings that are imported or linked from Autodesk Architectural Desktop and Autodesk Revit do retain the mapping coordinates that were assigned to objects by those products.

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**
Changing a map's location by moving the gizmo.

Gizmo transformations remain in effect if you select a new map type. For example, if you scale a spherical mapping gizmo and then switch to planar mapping, then the planar mapping gizmo is also scaled.

**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.

**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.

If you scale a gizmo smaller than the geometry, then a tiling effect is created, unless scaling has no effect on the map type in use. Tiling based on gizmo size is in addition to tiling values set in the Material Editor Coordinates rollout for the map or the UVW Map modifier tile controls.

The size of the gizmo affects how the mapping is applied to an object.
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. Manipulators appear as edges at the sides of the gizmo; typically they display as green. If the mapping type and gizmo are 3D, a green cube also appears at the top of the gizmo. When you move the mouse over a manipulator, the manipulator typically turns red to show that dragging or clicking it will have an effect. Also, a tooltip appears, showing the object name, the parameter, and its value.

There are no manipulators for these mapping types:
- Shrink Wrap
- Face
- XYZ to UVW

**NOTE:** When Real-World Map Size is on, gizmo manipulators appear only for the Planar and Box mapping types.

![Image](image.png)

**Adjusting an edge manipulator for Box mapping**

**Adjusting the height manipulator for Box mapping**

When you use the manipulator to adjust the Height, the gizmo remains centered on the Length/Width plane, so the Height adjustment scales the mapping.

**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. Material and UVW Map tiling are multiplied. For example, if a map in the Material Editor has a tile value of 2 on one axis, and a UVW Map modifier has a tiling value of 3 on the same axis, then the result is a tiling value of 6.

**Objects with No Mapping Coordinates**

If you render an object that doesn't have mapping coordinates or a UVW Map modifier, and the object uses a material with 2D bitmaps or 3D procedural maps that use explicit map channels, then a Missing Map Coordinates alert is displayed. The alert lists both the name of the object and the UVW channels or Vertex Color channels that are missing the coordinates. For example: (UVW 2): Torus01.

**Mapping Selection Sets or Grouped Objects**

You can apply one UVW Map modifier to a selection of objects. One large mapping gizmo will encompass the entire selection unless the Use Pivot Points option is turned on in the modifiers rollout before applying the UVW Map modifier. If the Use Pivot Points option is used then each object is encompassed with its own mapping gizmo.

If any of the objects in the selection has had its pivot point shifted in the Hierarchy ➤ Pivot panel, and you use the Use Pivot Points option with the UVW Map modifier, then the mapping gizmos are centered to the pivot points rather than the object center and the mapping may be tricky to position the way you want.
Procedures

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.
   **NOTE:** 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.

To use multiple **UVW** channels in the same object:

1. Assign Map channel 1 to an object. You can do this by either turning on Generate Mapping Coordinates in the Parameters rollout of any primitive, or by assigning a **UVW Map** modifier with channel 1 chosen.
   Generate Mapping Coordinates uses map channel 1 by default.
2. Assign a **UVW Map** modifier (or a second one, if you're using the first to assign channel 1). Choose channel 2 for this modifier.
   Both coordinate channels are now assigned to the geometry. The next step is to assign a mapped material that uses both channels.
3. Create a material with two maps. You can do this using a Composite map, or a Blend material with two maps, or you can have one map assigned to **Diffuse** and another assigned to **Bump**. Perhaps the easiest way to see the effect is to composite two maps, with the second map containing an alpha channel.
4. Go to the level of one of the maps and, in the Mapping list, choose Explicit Map Channel 2.
   The other map is already assigned channel 1 by default.
5. Assign the mapped material to the object.
   You can switch between viewing the maps in the viewport using the Show Map In Viewport control in the Material Editor. You can adjust the mapping of channel 2 without altering the mapping of channel 1 if you've assigned two **UVW Map** modifiers. Render the scene to see the effect.

Example: To use the **XYZ to UVW** option:
The **XYZ to UVW** option lets you make a 3D procedural texture, like Cellular, follow the animated surface of an object. If the object stretches, so does the 3D procedural texture.

1. In the Top viewport, create a box.
2. Create a material with a Cellular diffuse map.
3. In the Material Editor, on the Coordinates rollout of the Cellular map, open the Source drop-down list, and choose Explicit Map Channel.
   On the Coordinates rollout, the Map Channel parameter activates, leave the value at 1.
4. Assign the material to the box.
5. On the MODIFY panel ➔ Modifier List, choose **UVW Map**.
6. On the **UVW** Map modifier, turn on XYZ to **UVW**. By default, the Map Channel value is 1.

7. Render the Front viewport. The cellular pattern renders normally on the surface of the box.

8. Right-click over the object and choose Convert To: ➤ Convert to Editable Mesh from the Transform (lower-right) quadrant of the quad menu. The box is converted to an editable mesh.

9. On the **Modify panel** ➤ Selection rollout, click (Vertex) to turn it on.

10. In the Front viewport, select the top vertices of the box, and move them up.

11. Render the Front viewport again. The cellular pattern stretches with the box. This effect is enabled by the XYZ to **UVW** option. To see the difference, we will change the Source option in the Coordinates rollout in the Material Editor.

12. In the **Material Editor**, locate the diffuse Cellular material.

13. On the Coordinates rollout of the Cellular diffuse map, open the Source drop-down list and choose Object XYZ.

14. Render the Front viewport. The cellular pattern is no longer stretched.

**To transform the **UVW** Map gizmo:**

1. On the **Modify panel**, choose the **UVW** Mapping modifier in the stack display.

2. In the stack display, choose the Gizmo sub-object level. The gizmo changes to a yellow color, with one green edge. The green edge indicates the right edge of the texture.

3. Move, scale, or rotate the gizmo in the viewports, or use the Length and Width controls in the **UVW** Map modifier. Transforming the map gizmo shifts the bitmap, allowing you to orient and move the map on the object's surface.

**To use manipulators to control the width and length:**

1. On the **Modify panel**, choose the **UVW** Map modifier in the stack display. You can also be at the Gizmo level of the modifier.

2. On the main toolbar, click to turn on (Select And Manipulate). Green edges appear along the sides of the **UVW** Map modifier's gizmo. An edge turns red when you move the mouse over it.

3. Drag an edge of the gizmo to adjust the width or length. A tooltip shows the new width or length value.

**To use manipulators to control vertical scale:**

1. On the **Modify panel**, choose the **UVW** Map modifier in the stack display. You can also be at the Gizmo level of the modifier.
2. On the main toolbar, click to turn on (Select And Manipulate). For 3D mapping types, a green cube appears at the top of the UVW Map modifier’s gizmo. The cube turns red when you move the mouse over it.

3. Drag the cube to adjust the height of the gizmo.
A tooltip shows the new tiling value in the vertical dimension.

**Interface**

**Modifier Stack**

**Gizmo sub-object level**

Enables gizmo transformations. At this sub-object level you can move, scale, and rotate the gizmo in the viewports to position the mapping.

**TIP:** To see the map move on the object surface as you transform the gizmo, enable one of the Show Map In Viewport options.

**Parameters rollout**

**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.

**NOTE:** When Real-World Map Size is on, only the Planar, Cylindrical, Spherical, and Box mapping types are available. Similarly, if one of the other options (Shrink Wrap, Face, or XYZ To UVW) is active, Real-World Map Size is unavailable.

**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.

**Planar map projection**

**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.
Cylindrical map projection

Cap

Applies planar mapping coordinates to the caps of the cylinder.

**NOTE:** If the ends of the object geometry are not at right angles to the sides, the Cap projection bleeds onto the sides of the object.

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.

Spherical map projection

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.

**Shrink-wrap projection**

**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.

**Box projection (shown on a box and on a sphere)**

**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.
Face projection

**XYZ to UVW**

Maps 3D procedural coordinates to **UVW** coordinates. This "sticks" the procedural texture to the surface. If the surface stretches, so does the 3D procedural map. Use this option with procedural textures, like Cellular, on objects with animated topologies.

For more information on how to use this option, see Example: To use the XYZ to **UVW** option: XYZ to **UVW** option (**UVW** map modifier).

**TIP:** In the Material Editor’s Coordinates rollout for the map, set Source to Explicit Map Channel. Use the same map channel in the material and **UVW** Map modifier.

A sphere with a 3D procedural texture is copied, and the copies are stretched.

Right: Using XYZ to **UVW** on the object enables the 3D procedural texture to stick and stretch with the surface.

**Length, Width, Height**
Specify the dimensions of the UVW Map gizmo. The default scale of the mapping icon is defined by the largest dimension of the object when you apply the modifier. You can animate the projection at the gizmo level. Note the following facts about these spinners:

- The dimensions are based on a bounding box of the gizmo.
  The Height dimension is unavailable for the Planar gizmo: It does not have depth. Likewise, the dimensions for Cylindrical, Spherical, and Shrink Wrap mapping all display the dimensions of their bounding box and not their radiuses. No dimensions are available for the Face map: Each face on the geometry contains the entire map.

- The three dimensions are set to 1 or 2, depending on map type and dimensions, when you load files created in Autodesk VIZ or earlier versions of 3ds Max. (This maintains compatibility with files from previous releases, in which gizmos were scaled non-uniformly to adjust their dimensions.).
  The dimensions essentially become scale factors rather than measurements. You can reset the values to dimensions by clicking the Fit or Reset buttons, which will lose the original non-uniform scaling.

**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.

<table>
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<th>Channel group</th>
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| Each object can have up to 99 different UVW mapping coordinate channels; one per modifier. The default mapping channel (from the Generate Mapping Coordinates toggle in the object’s creation parameters) is always channel 1. The UVW Map modifier can specify coordinates for any channel. This lets you have many different sets of coordinates on the same face simultaneously. **IMPORTANT:** The UVW Map modifier works on only one map channel at a time. When you change channels, 3ds Max copies the current edits to the new channel without alerting you. To apply different UVW mapping in different channels, use multiple modifiers (Unwrap UVW or UVW Map).

If you already have edits in that channel from another modifier, those edits could be overwritten. To ensure preservation of your edits, save them before changing channels and then reload the saved edits as necessary.

**Map Channel**

Sets the map channel. The UVW Map modifier defaults to channel 1, so mapping behaves in the default fashion unless you explicitly change to another channel. Default=1. Range=1 to 99

If you specify a different channel, make sure any maps in the object’s material that should use that mapping are also set to that channel.

You can use multiple UVW Map modifiers in the modifier stack, each one controlling the mapping coordinates of different maps in a material.
The map channel setting is available in various places in 3ds Max, as follows:

- **Generate Mapping Coords** This checkbox, present in the creation parameters of most objects, assigns map channel 1 when on.

- **UVW Map, UVW Xform, and Unwrap UVWs modifiers** These modifiers let you set the map channel to 1 through 99, thus specifying which UVW coordinates the modifier uses. The modifier stack can pass these channels simultaneously for any face.

- **Material Editor Channel Assignment** You assign the channel to be used by a map on the Coordinates rollout at the map level in the Material Editor. The Explicit Map Channel option must be active.

- **NURBS Surface Objects and Sub-Objects** Let you specify which map channel the surface uses.

**Vertex Color Channel**

Define the channel as a vertex color channel by choosing this option. Be sure to match any material mapping in the coordinates rollout to be Vertex Color as well, or by using the Assign Vertex Colors utility.

**Alignment group**

**X/Y/Z**

Select one of these to flip the alignment of the mapping gizmo. Each specifies which axis of the gizmo is aligned with the local Z axis of the object.

**NOTE:** These options aren't the same as the Flip checkboxes beside the U/V/W Tile spinners. The Alignment option buttons actually flip the gizmo orientation, while the Flip checkboxes flip an assigned map's orientation.

**Manipulate**

When on, a gizmo appears on the object that lets you change parameters in the viewport. When Real-World Map Size is on, Manipulate is available only with the Planar and Box mapping types. For more information, see Manipulators for UVW Map.

**Fit**

*TIP:* Turn on snapping to adjust the mapping precisely.
Fits the gizmo to the extents of the object and centers it so that it's locked to the object's extents. Unavailable when Real-World Map Size is on.

**Center**

Moves the gizmo so that its center coincides with the center of the object.

**Bitmap Fit**

Displays the standard bitmap file browser so that you can pick an image. Unavailable when Real-World Map Size is on.

For planar mappings, the map icon is set to the aspect ratio of the image. For cylindrical mapping, the height (rather than the radius of the gizmo) is scaled to match the bitmap. For best results, first use the Fit button to match the radius of the object and gizmo, and then use Bitmap Fit.

**Normal Align**

Click and drag on the surface of the object to which the modifier is applied. The origin of the gizmo is placed at the point on the surface where the mouse is pointing; the XY plane of the gizmo is aligned to the face. The X axis of the gizmo lies in the object’s XY plane.

Normal Align respects smoothing groups and uses the interpolated normal based on face smoothing. As a result, you can orient the mapping icon to any part of the surface, rather than having it "snap" to face normals.

**View Align**

Reorients the mapping gizmo to face the active viewport. The size of the icon is unchanged.

**Region Fit**

Activates a mode in which you can drag in the viewports to define the region of the mapping gizmo. The orientation of the gizmo is not affected. Unavailable when Real-World Map Size is on.

**Reset**

Deletes the current controller controlling the gizmo and plugs in a new one initialized using the Fit function. Any animation to the gizmo is lost. As with all the alignment options, you can cancel the reset operation by clicking Undo.

**Acquire**

Effectively copies the UVW coordinates from other objects When you pick an object from which you want to acquire UVWs, a dialog prompts you whether the acquire should be done in an absolute or relative fashion.

If you choose Absolute, the acquired mapping gizmo is positioned exactly on top of the mapping gizmo you pick. If you choose Relative, the acquired mapping gizmo is positioned over the selected object.

**Display group**

This setting determines whether and how mapping discontinuities, also known as seams, appear in the viewports. The seams appear only when the Gizmo sub-object level is active.

TIP: The default seam color is green; to change it, go to Customize menu ➤ Customize User Interface ➤ Colors tab, and then from the Elements drop-down list, choose UVW Map.

The options are:

- **Show No Seams** Mapping boundaries don't appear in the viewports. This is the default choice.
• **Thin Seam Display** Displays mapping boundaries on object surfaces in the viewports with relatively thin lines. The line thickness remains constant as you zoom the view in and out.

• **Thick Seam Display** Displays mapping boundaries on object surfaces in the viewports with relatively thick lines. The line thickness increases when you zoom the view in and decreases when you zoom out.

**Unwrap UVW Modifier**

The Unwrap UVW modifier lets you assign mapping (texture) coordinates to objects and sub-object selections, and to edit those coordinates by hand as well as with a variety of tools. You can also use it to unwrap and edit existing UVW coordinates on an object. You can adjust mapping to fit on Mesh, Patch, Polygon, HSDS, and NURBS models using any combination of manual and several different procedural methods.

- Select one or more objects. ➤ Modify panel ➤ Modifier List ➤ Object-Space Modifiers ➤ Unwrap UVW
- Standard menu: Select one or more objects. ➤ Modifiers menu ➤ UV Coordinates ➤ Unwrap UVW
- Enhanced menu: Select one or more objects. ➤ Modifiers menu ➤ UVs, Maps and Materials ➤ Unwrap UVW

You can use Unwrap UVW as a self-contained UVW mapping tool and texture-coordinate editor, or in conjunction with the UVW Map modifier. In the latter case, you usually do so in order to use a mapping method unavailable in Unwrap UVW, such as Shrink Wrap. You can animate UVW coordinates by turning on the Auto Key button and transforming the coordinates at different frames.

In using Unwrap UVW, you usually break up the object’s texture coordinates into smaller groups known as clusters. That way you can position the clusters precisely over different areas of the underlying texture map for optimal mapping accuracy. Each of these clusters has an outline called a map seam which appears superimposed over the object in the viewports. This helps you visualize the locations of mapping clusters on the object surface. You can toggle this feature and set the line thickness with the Display settings.

[Open UVW map seams shown on head model in viewport]

**Self-Contained Mapper and UVW Coordinate Editor**

Rather than creating a large modifier stack by first making a sub-object selection of polygons and then adding a UVW Map modifier to specify the type of mapping, you can use the Unwrap UVW modifier to do both. You can select sub-object vertices, edges, or polygons/patches, store sub-object selections as named selections, map them using planar and other methods, and then edit the UVW coordinates for each sub-object selection, all from within the Unwrap UVW modifier. For example, to map a character's face using three planar maps, you could create three sub-object selections of the front and sides of the face, planar-map the selections individually, and then edit the UVW coordinates for each selection, all without leaving the Unwrap UVW modifier.

**Support for Multiple Unwrap Objects**

Instancing capabilities in Unwrap UVW make it easy to apply texture coordinates across several objects. First
select the objects, then apply Unwrap UVW. When you open the editor, you’ll see the mapping coordinates for all selected objects containing the instanced modifier. The editor shows each object’s wireframe color to help you see which set of coordinates belong to each object.

Left: Two objects’ UVW coordinates in the editor, showing wireframe colors
Right (inset): The objects with a shared Unwrap UVW modifier in the viewport
TIP: The UVWs of different objects typically start out overlapped in the editor, so it’s a good idea to separate them before editing. To save time, use one of the Pack tools.

What Happens to Existing UVW Coordinates
When you apply the Unwrap UVW modifier, it stores the object’s current mapping coordinates in the modifier. If the object has no mapping coordinates, the modifier creates new ones by applying planar mapping. If the incoming data on the stack is a face-level or polygon-level sub-object selection, then only the UVWs for the selected polygons are brought into the modifier.

When the modifier is evaluated, its UVWs are reassigned to the object flowing down the pipeline. So if the UVWs upstream are changed, the changes won’t make it past the Unwrap UVW modifier. If the Unwrap modifier is operating on a selection of polygons, then upstream changes to unselected polygons will still be able to flow past the Unwrap modifier.

Native Support for HSDS, Polygon Object, and Patch mapping
Unwrap UVW supports polygons and Bezier quad and tri patch faces in addition to triangles and quads. Below is a sample of what the various face types look like based on the incoming type. For HSDS and Poly surfaces, the basic interface remains the same, except that the maximum number of sides per polygon increases from 4 to over two billion. HSDS supports only one level of detail: the level at which the mapping was. Patches have handles on nonlinear vertices. These handles work just like regular patch handles.

Polygons and faces from HSDS and Poly surfaces; handles appear for nonlinear vertices

Freezing Textures
Although not its primary purpose, you can use the Unwrap UVW modifier to freeze UVWs. You can apply mapping after an animated deformation and have the mapping stick to the object. For example, you can apply Unwrap UVW above a Morpher modifier in the modifier stack, apply planar maps and edit the UVW coordinates. The mapping will follow the morphing geometry.

Procedures
To perform quick planar mapping:
You’ll find the Quick Planar Map controls on the Edit UVs rollout of the Unwrap UVW modifier.

- Apply Unwrap UVW to an object.
- Go to the Polygon sub-object level.
- Make sure (Display Quick Planar Map) is on.
- Select the polygons to map.

The Quick Planar Map gizmo appears as a yellow wireframe rectangle superimposed over the polygon selection, showing the default Averaged Normals mapping. Even though the X button displays by default, Averaged Normals is the default setting.
Quick Planar Map gizmo superimposed over selected polygons

1. To use a different orientation for the mapping, choose X, Y, or Z from the flyout.

2. To apply the mapping, click (Quick Planar Map). To map additional polygons, proceed from step 3.

To use Unwrap UVW with the standard mapping methods:
This procedure offers a general overview of using the basic Unwrap UVW tools available on the Modify panel and the Edit UVWs dialog. Unwrap UVW provides many additional tools not described in this procedure, particularly in the editor.
For procedures detailing other mapping methods available with Unwrap UVW, see To use Peel Mode, To use Pelt mapping and To use Spline mapping.

1. Apply the modifier and a textured material (typically containing an image- or pattern-based Diffuse map) to an object. Set the material to display in the viewports, set at least one viewport to be shaded (for example, press F3 to toggle between wireframe and shaded), and, if necessary, turn off Shade Selected Faces (press F2) for that viewport so the texture mapping is visible.

2. Go to the Polygon sub-object level of the Unwrap modifier and make a selection of contiguous polygons. You'll use a single mapping type on this selection. Within the single modifier, you can apply as many different mappings as you like to different polygon selections.

3. Name the polygon selection using the Named Selection Sets function on the main toolbar. This step isn't required, but is recommended so you can easily restore the selection for subsequent mapping adjustments. For example, if you're working on a house, you could use names such as roof and front. **IMPORTANT:** After typing the selection set name, be sure to press Enter.

4. On the Projection rollout, click the appropriate mapping type button (Planar Map, Box Map, and so on) and then adjust the gizmo using any combination of the transform tools (Move, Rotate, Scale) in the viewports and the Align Options tools (Align To X and so on) on the Projection rollout.

The mapping options on the Projection rollout (top row) from left to right: Planar, Cylinder, Sphere, and Box

**TIP:** To reset the mapping to the default, click (Best Align). Each time you adjust the mapping gizmo, the texture display in the viewports updates to reflect the mapping changes. You can also open the editor (Edit UVs rollout ➤ Open UV Editor) to view the changes in the generated texture coordinates as you adjust the gizmo.

5. To exit mapping for this polygon selection, click the mapping type button again.

6. Continue making and naming selections and applying mapping until the entire mesh is mapped. Use the green seam display lines as a guide. If you don't see them, make sure Configure rollout ➤ Display Group ➤ Map Seams is on.

7. Open the Edit UVWs dialog (Edit UVs rollout ➤ Open UV Editor).
By default, the editor displays a checkered background. To view the map in the material on the object, you need to change a setting.

8. At the right end of the editor upper toolbar, click the drop-down list that currently reads CheckerPattern (Checker) and choose the map that’s applied to the material. The map appears as the background.

By default, all the UVW clusters display. To work on one cluster at a time, you need to filter the UVWs.

9. On the Edit UVWs dialog lower toolbar, click (Display Only Selected Polygons).

At this point, the editor shows only polygons you select in the viewport, and hides the rest. You can select polygons to show directly in the viewport, or choose a named selection set. In the next step, you’ll use the latter method.

10. On the main toolbar, open the Named Selection Sets drop-down list, and choose one of your named selection sets.

The viewports show the selection as active, and the UVW coordinates for the selection appear in Edit UVWs window.

11. In the Edit UVWs window, select and move one or more UVW polygons.

In the viewports, the texture slides around the selected portion of the object mesh.

12. Choose a different selection set and edit its UVW coordinates.

Again, the viewport display reflects the editing changes.

13. In a viewport, drag a region to select a group of polygons.

The polygons' UVW coordinates display in the Edit UVWs window. This is another way of choosing what you want to work on.

As you can see, from within the Unwrap UVW modifier you can assign multiple mapping types to different, optionally named polygon selections, and then edit the UVW coordinates to fine-tune map placement on the geometry.

To export texture coordinates to a paint program:

Once you've laid out an object's texture coordinates in the Unwrap UVW modifier editor, you can use this feature to export them to a paint program for creating the texture map.

**TIP:** Alternatively, you can use the Viewport Canvas feature to paint a texture directly onto the object surface within the 3ds Max viewport.

1. Apply the Unwrap UVW modifier to your object and use the modifier tools to set up the mapping. Texture-coordinate areas that use the same part of the texture map should overlap in the editor.

2. From the Edit UVWs dialog menu bar, choose Tools ➤ Render UVW Template.

This opens the Render UVs dialog:

3. Set the Width and Height values to the output resolution you want in the rendered template. You’ll usually get good results by setting the desired width and then clicking Guess Aspect Ratio.

**TIP:** When creating texture maps for gaming and other real-time 3D engines, be sure to set both dimensions to powers of 2: 256, 512, 1024, and so on.

4. Change the remaining values as needed. By default, the template is
rendered with the edges as white and opaque (alpha=1.0), and background is empty and transparent (background alpha=0.0), but you have a variety of choices here, as detailed in Render UVs Dialog.

5. At the bottom of the dialog, click Render UV Template. This opens a new rendered frame window containing the rendered template as a bitmap. Inspect the output, and if changes are necessary, make them on the Render UVs dialog and re-render.

6. When you’re satisfied with the results, then on the rendered frame window toolbar, click (Save Bitmap), and then use the file dialog to specify the file type and name. Click Save to export the file. If you want to use the rendered transparency information in the paint program, be sure to save in a format that supports the alpha channel, such as TIF or Targa.

7. Open the exported image in a paint program and use the rendered edges as a guide for painting the texture map. Save the image when done.

8. Back in 3ds Max, create a material, set the Diffuse map to Bitmap, and open the file from the previous step.

9. Apply the material to your mesh object.

The painted texture map follows the outlines set up by the exported UVs.

Example: To use Peel Mode:
The Peel toolset provides an implementation of the LSCM (Least Square Conformal Maps) method of unwrapping texture coordinates, for an easy and intuitive workflow in flattening complex surfaces. This procedure shows some of the basic methods available with the Peel tools used on a simple character model. The idea is to give you a rough idea of how to use them in your own projects with more-complex objects such as character meshes.

1. Create or load a model and apply Unwrap UVW to it.

TIP: If you want to follow along with this procedure, you can use the same model, which is from the scene file CMan0002-M3-CS.max, included in the [Project Folder]\Scenes folder in your installation of Autodesk 3ds Max 2015. If you’re using a computer on which a different user installed 3ds Max, you’ll need to look in that user’s personal folder.

After opening the file, you might want to select all the bones in the scene and delete them. Also, delete the Skin modifier, apply a new, blank material, apply a UVW Map modifier, and collapse the stack (or use some other method of resetting the UVs).

2. Create seams for subdividing the model for peeling.

TIP: One handy way to create seams is to select edges ( ) using the additional tools available at that level, such as (Loop). You can then make seams out of the edge selection with (Convert Edge Selection To Seams).

The following illustration shows seams created for the arm:

Typically you’d create seams for the entire character mesh before proceeding.

3. On the modifier Selection rollout, go to (Polygon) sub-
object level and select a polygon on the arm.

4. On the Peel rollout, click \( \text{Expand Polygon Selection to Seams} \).
   This selects all polygons on the arm enclosed by the seams.

5. On the Peel rollout, click \( \text{Peel Mode} \).
   The Edit UVWs dialog opens with the arm cluster flattened and ready to work with in Peel Mode, along with other, non-flattened clusters, such as the hand at bottom-left. (Note: Your results might differ, and probably will.)
   This demonstrates that, if the Polygon sub-object level is active and any polygons are selected when you activate Peel Mode, only those polygons are peeled. You'll demonstrate this further in the next step.

The peeled cluster uses distinctive coloring, which makes it easy to see which part of the texture coordinates you're peeling. The color is violet by default; to adjust the color, change the Peel Color setting.

**NOTE:** The editor dialog also provides a Peel rollout with the same Peel tools as on the Modify panel, plus some additional tools for working with pins, which this procedure will cover shortly.

6. If the clusters overlap, as in the preceding illustration, click \( \text{Pack: Custom} \) on the Arrange Elements rollout to separate them.

7. Make sure the Vertex sub-object level (\( \text{Vertex} \)) is active (this happens by default when you turn on Peel Mode) and that no vertices are selected, then drag a vertex in an non-peeled cluster such as the hand. Next, drag a vertex in the peeled cluster.
   To see this, play the following video:

   As you can see, dragging a vertex in a non-peeled cluster moves only that vertex, whereas dragging a vertex in a peeled cluster affects the entire cluster. This is one of the main purposes of the Peel feature: moving only a few vertices to reshape a cluster while maintaining its overall topographic integrity.

   One of the main purposes of Unwrap UVW is to make the texture coordinates regular with respect to the mesh, so you don't get stretching and other textural anomalies. For better visual feedback when doing so, you can turn on the display of the checker background on the model in shaded viewports.

8. Undo any changes from the previous step, then open the drop-down list at the top-right of the dialog and choose CheckerPattern (Checker).
The label already appears, but choosing it from the list activates the pattern, making it visible on the model.

As you can see, the pattern is already pretty regular, thanks to the Quick Peel that Peel Mode applies when you first invoke it. The remainder of this procedure will simply show some of the tools available in Peel Mode.

For example, to make it easier to match the arm or sleeve cluster to an existing texture, you might want to make it more rectangular. But first you'll isolate the cluster.

9. Isolate the cluster(s) you want to work on by selecting other clusters and move them out of the way. Make sure the Vertex sub-object level is active and that no vertices are selected. Sometimes it's a good idea to start the peeling procedure by identifying parts of the cluster whose shape you want to keep, then locking down or "pinning" key texture vertices. The left side of the cluster is already approximately rectangular, so you can start there.

**NOTE:** Peel Mode spreads the texture coordinates among pinned vertices (which have blue outlines) on the cluster. Because at least two pins are needed for peeling, the Unwrap UVW modifier chooses two pins by default that are used if you start moving vertices without specifying any pins. However, you can specify which pins to use. You can pin vertices manually with Pin Selected, as shown in the next step.

Or when (Auto-Pin Moved Vertices) is on, moving a vertex pins it.

In general, it's a good idea to pin any vertices that you want to hold still first, and then move any vertices that you want to reposition.

10. Select the two corner vertices and then click (Pin Selected). Then select the default pins and click (Unpin Selected).

    Note the change in size in the cluster after pinning and unpinning the vertices. Because Peel Mode is still in effect, changing the pinned vertices affects the tension of the cluster, resulting in the size change.

    **NOTE:** You can move a pinned vertex directly by dragging it; it then acts like any other vertex in Peel Mode. The only difference is that it doesn't respond when you drag other vertices.

11. Change the zoom level if necessary, then move vertices on the irregular side until you get a roughly rectangular shape.

    To see this, play the following video:

    As you drag, the other non-pinned vertices move as well; Peel Mode does this to maintain the overall topology.
Notice that, the more pinned vertices there are near the vertex you're moving, the greater the amount of local control you have. Also, remember that you can always move a pinned vertex directly.

**TIP:** It can be useful to align (see Quick Transform rollout) or relax (see Reshape Elements rollout) vertices while in Peel Mode, but they need to be pinned first.

Sometimes while you're peeling you might want to subdivide a cluster partially, such as a head texture from the back of the neck to the crown of a head. We'll simulate that in the next couple of steps.

12. Starting at the cluster outline, select several edges in a line.

13. On the Explode rollout, click (Break). The edges separate, pulled apart by Peel Mode's retensioning effect.

14. Following are some additional tools you might want to use with Peel Mode:
   - To create a new cluster, select some contiguous polygons and click (Reset Peel). This breaks off the selection as a cluster and applies a Quick Peel.
   - To remove pins from vertices, select the vertices and click (Unpin Selected). For other pin-related tools, see Pins group.

**Interface**
After you apply the Unwrap UVW modifier, its interface appears on the Modify panel, comprising the modifier stack plus several rollouts:

**Modifier Stack display**

Normally, when you apply Unwrap UVW to an object, the modifier stack provides access to texture coordinates at the Vertex, Edge, and Polygon sub-object levels. The Vertex and Edge sub-object levels are useful for making UVW vertex and edge selections in the viewports, where texture mapping on the object surface is more readily visible, and the Edge level is also useful for setting up edge selections that you can later convert to seams for use with the Pelt and Peel tools.

If you apply Unwrap UVW to an active face or polygon selection of an Editable/Edit Mesh/Poly object, or to an active patch selection of an Editable/Edit Patch object, only that selection is available for editing with
the modifier. If you then change the face or polygon selection in the object, the modifier updates the inherited selection and, again, makes only those polygons available for editing.

When you first apply the Unwrap UVW modifier to an object, no sub-object level is active (even though one of the sub-object buttons on the Selection rollout is always highlighted). You can access a sub-object level from the modifier stack or Selection rollout, or you can just open the Edit UVWs dialog, which activates the Vertex sub-object level, unless a different level is already active. While the editor is open, the sub-object level is synchronized among the modifier stack, the Selection rollout (see following) and the Sub-object Selection toolbar on the Edit UVWs dialog. When you activate a sub-object level in one, it's also activated in the others. Similarly, selecting sub-objects in a viewport selects them in the editor and vice-versa.

When you close the editor, the current sub-object level remains active. You can exit this level in the modifier stack display by clicking the modifier name or the highlighted level.

Selection rollout
This rollout contains tools for selecting texture coordinates for manipulating with other tools in the Unwrap UVW modifier.

NOTE: Some tools here are for selecting sub-objects procedurally rather than explicitly. For example, the Grow: XY Selection tool automatically selects sub-objects connected to the current selection. Such tools work in object (XY) space, as opposed to the comparable tools on the Edit UVWs dialog, which work in texture (UV) space.

For example, say you have a character mesh whose geometry is a single element, but whose texture coordinates are separated into different clusters (head, hands, etc.), for mapping purposes, in the editor. If you go to the Polygon sub-object level of the modifier on the command panel, select a polygon in the viewport, and click the Grow button repeatedly, eventually you'll select the entire model. But if you do the same in the editor, starting with one selected polygon, the most you can ever select with the Grow tool is the cluster to which that sub-object belongs, such as the head.

The following video shows a sphere with Unwrap UVW applied, which was then used to flatten the mapping, resulting in several UVW clusters. First, a few vertices are selected in one cluster in the viewport and the Grow: XY Selection is clicked repeatedly, growing the vertex selection beyond the cluster. Then the vertices are deselected, and a vertex is selected in the cluster in the editor. This time, clicking the Grow button in the editor repeatedly again grows the selection, but not beyond the cluster.

- **Vertex/ Edge/ Polygon**
  Enables selection at the respective texture sub-object level. These buttons are the equivalents of the sub-object levels on the modifier stack (see preceding) and on the Edit UVWs dialog.

- **Select by Element XY Toggle** - When on and a sub-object level of the modifier is active, clicking an element in the modified object selects all sub-objects at the active level in that element. This is different from the Select by Element UV Toggle on the Edit UVWs dialog toolbar, which applies to clusters of texture coordinates.

**Modify Selection group**

- **Grow: XY Selection** - Expands the selection by selecting all sub-objects connected to selected sub-objects.
For an explanation of the difference between this Grow tool and the one in the UV editor, see the introduction to this section.

**Shrink: XY Selection** - Reduces the selection by deselecting all sub-objects adjacent to non-selected sub-objects.

**Loop: XY Edges** - Expands the selection as far as possible, in alignment with selected edges. Loop applies only to edge selections, and propagates only through junctions of even numbers of edges.

**Ring: XY Edges** - Expands an edge selection by selecting all edges parallel to the selected edges. Ring applies only to edge selections.

### Select By group

- **Ignore Backfacing** - When on, prevents the selection of sub-objects not visible in the viewport.

**Point-to-Point Edge Selection** - When on, at the Edge level you can select connected edges by clicking successive vertices on the object. While the tool is active, a rubber-band line connects the last vertex you clicked on with the mouse cursor.

To exit from making the current selection, right-click once. At that point, the tool remains active so you can start a new selection elsewhere on the object. To exit the tool completely, right-click a second time.

**Select by Planar Angle** - When active, you can select contiguous coplanar polygons with one click. Turn this on and use the numeric setting to specify the threshold angle value that determines which polygons are coplanar. Then click a polygon to select it and all contiguous polygons whose angles are less than the threshold value.

Select By Planar Angle is available only at the Polygon sub-object level.

**Select by Material ID: XY** - Enables polygon selection by material ID. Specify the material ID to select, and then click Select by Material ID.

Select By Material ID is available only at the Polygon sub-object level.

**Select by Smoothing Group: XY** - Enables polygon selection by smoothing group. Specify the smoothing group to select, and then click Select by Smoothing Group.

Select by Smoothing Group is available only at the Polygon sub-object level.

### Edit UVs rollout

- **Open UV Editor** - Opens the Edit UVWs dialog.

**Tweak In View** - When on, you can adjust one texture vertex at a time by dragging a vertex on the model in the viewport. When you do so, the vertex doesn't move in the viewport, but the mapping changes as a result of the vertex moving in the editor. To see the mapping change as you tweak vertices, the object must be mapped with a texture and the texture must be visible in the viewport.

If the Edit UVWs dialog is open, it updates in real time. Applies at the modifier level and all sub-object levels.
Quick Planar Map—Applies planar mapping to the current texture-polygon selection based on the orientation of the Quick Map gizmo.

Using this tool "breaks" the selected texture polygons off as a separate cluster, which is then scaled to fit the editor extents, using the alignment specified on this rollout.

Display Quick Planar Map—When on, a rectangular planar mapping gizmo, applicable to the Quick Planar Map tool only, appears juxtaposed over the polygon selection in the viewports. You cannot adjust this gizmo by hand, but you can use the following control to reorient it.

X/Y/Z/ Averaged Normals—Choose the alignment for the quick planar map gizmo from the flyout: perpendicular to the object's local X, Y, or Z axis, or based on the polygons' average normals.

NOTE: Although the X icon shows by default, the actual default choice for this setting is Averaged Normals.

Channel rollout

Reset UVWs—Restores the UVW coordinates to their previous state on the modifier stack; that is, the coordinates inherited from the stack by the Unwrap modifier.

Clicking this is almost the same as removing and reapplying the modifier, except that a map assigned in the Edit UVWs dialog is not deleted. For example, if you forgot to turn on the Generate Mapping Coordinates checkbox for an object, and then applied the Unwrap UVW modifier, the modifier would have no UVW coordinates to use and its settings would be wrong. If you then go back in the Stack and turn on Generate Mapping Coordinates, you'd need to click the Reset UVWs button. When you click this button, an alert warns you that you're losing any edits you've made.

Save—Saves the UVW coordinates to a UVW (.uvw) file.

Load—Loads a previously saved UVW file.

Channel group

Each object can have up to 99 different UVW mapping coordinate channels. The default mapping channel (from the Generate Mapping Coordinates toggle in the object’s creation parameters) is always channel 1. You can specify texture coordinates for any channel by using a different Unwrap UVW or UVW Map modifier for each channel.

Map Channel—Sets the identification number of the texture coordinates controlled by this modifier. This channel value corresponds to the Map Channel value set in a map’s parameters, so that the modifier controls how maps set to the same channel are applied to the object surface. Default=1. Range=1 to 99

Please note the following important points about map channels in the Unwrap UVW modifier:

- Each modifier contains edits to only one channel, set in the modifier.
- The mapping in this modifier must use the same channel set in the material's image map (see following list).
- Changing the map channel in the modifier opens a Channel Change Warning dialog that gives you the option to copy the existing edits to the new channel, or abandon them and use the mapping this channel contained before this modifier changed it (see following illustration).
To apply different mapping coordinates for different maps on the same object, use a new modifier with a unique map channel per image map. You can collapse the stack when finished, and the mapping is preserved.

The map channel setting is available in various places in 3ds Max, as follows:

- **Generate Mapping Coords** This checkbox, present in the creation parameters of most objects, assigns map channel 1 when on.
- **UVW Map, UVW Xform, and Unwrap UVWs modifiers** These modifiers let you set the map channel to 1 through 99, thus specifying which UVW coordinates the modifier uses. The modifier stack can pass these channels simultaneously for any polygon.
- **Material Editor Channel Assignment** You assign the channel to be used by a map on the Coordinates rollout at the map level in the Material Editor. The Explicit Map Channel option must be active.
- **NURBS Surface Objects and Sub-Objects** Let you specify which map channel the surface uses.

**Vertex Color Channel**

Define the mapping channel as a vertex color channel by choosing this option. Be sure to match any material mapping in the coordinates rollout to be Vertex Color as well, or by using the Assign Vertex Colors utility.

**Peel rollout**

The Peel tools provide an implementation of the L SCM (Least Square Conformal Maps) method of unwrapping texture coordinates, for an easy and intuitive workflow in flattening complex surfaces. This rollout also provides access to the Pelt method of unwrapping texture coordinates, as well as seam tools for use by the Peel and Pelt tools.

The Peel tools are available initially only when the Polygon sub-object level is active and texture polygons are selected. The peeling operation you choose applies only to those selected polygons. However, when Peel Mode is active, the Peel Mode button remains active and available no matter which sub-object level you activate. You can select different sub-objects while using Peel Mode, but only the texture coordinates that belong to the polygons that were selected when you first activated Peel Mode are subject to peeling.

To peel different polygons, turn off Peel Mode, make a different selection, and then reactivate Peel Mode. For a brief demonstration of how to use the Peel tools, see this procedure.

**NOTE:** The Peel tools are also available on the Edit UVs dialog > Peel rollout. That rollout also includes a Detach option as well as tools for working with the Pin aspect of the Peel feature. When using Peel, pinned vertices are held in place while the rest of the vertices move.

**Quick Peel**

Performs a "best-guess" Peel operation on all vertices (except pinned ones) that belong to the selected texture polygons. To do so, Quick Peel distributes the vertices evenly based on their average locations while trying to maintain existing polygon shapes. If Detach is on, Quick Peel also separates the peeled cluster from the other texture coordinates.
Quick Peel is suitable for simple texture-mapping applications, but for better control, use Peel Mode instead (see following).

TIP: In some cases, repeated applications of Quick Peel can improve the results.

**Peel Mode** - Applies a Quick Peel (see preceding) and then stays active so you can adjust the layout of the texture coordinates interactively. You do so by dragging sub-objects in the Edit UVWs dialog window, which redistributes all vertices in the cluster evenly around any pinned vertices. To exit Peel Mode, click this button again.

While Peel Mode is active, peeled polygons use distinctive coloring, which makes it easier to see which part of the texture coordinates you're peeling. The color is violet by default; to adjust the color, change the Peel Color setting.

Activating Peel Mode automatically switches to the Vertex sub-object level, but you can use Peel Mode at any sub-object level. When Detach is on, Peel Mode also separates the peeled cluster from the other texture coordinates.

While Peel Mode is active, you can create seams with the Edit Seams and Point-to-Point Seams tools and they automatically "peel" off as you go. Alternatively, in the editor, select some edges and use the Break tool to split the edges and automatically re-peel the cluster.

When Auto-Pin Moved Vertices is on (the default), moving a sub-object in Peel mode pins (locks) all vertices belonging to the sub-object.

**Reset Peel** - Merges existing map seams of the polygon selection, converts Peel seams to new map seams, and then Peels the resulting clusters. The borders of the selection are separated from the other clusters and become new map seams.

Use Reset Peel to reconnect map seams on previously mapped geometry, or to quickly break off and Peel a selection.

**Pelt** - Applies pelt mapping to selected polygons. Clicking this button activates Pelt mode, in which you can adjust the mapping and edit the pelt map.

NOTE: Pelt mapping always uses a single planar mapping for the entire pelt. If you've applied a different type of mapping, such as Box, and then switch to Pelt, the previous mapping is lost.

TIP: For the basic method of using Pelt mapping, see this procedure.

**Seams group**

Use seams to specify cluster outlines for Peel mapping (see preceding) and pelt mapping, as well as to spline mapping (when you use manual seams). Peel/pelt seams are blue, as opposed to the green Map seams that indicate cluster borders.

Peel/Pelt seams (left) are converted to Map seams (right) after peeling.
**Edit Seams**—Lets you create pelt/peel seams by selecting edges with the mouse in the viewports. Available at all sub-object levels of the Unwrap UVW modifier.

Using Edit Seams is similar to standard edge selection, with one difference: Designating seams is cumulative by default. That is, you need not hold Ctrl to add edges to the seam collection. With Edit Seams on:

- To designate an edge as part of a seam, click the edge. This does not remove edges currently in seams.
- To designate multiple edges as seam edges, drag a region.
- To remove one or more edges from the current seams, hold Alt and click an edge or drag a region.

**Point-to-Point Seams**—Lets you specify pelt/peel seams by selecting vertices with the mouse in the viewports. Seams you specify with this tool are always added to the current seam selection. Available at all sub-object levels of the Unwrap UVW modifier.

In this mode, after you click a vertex, a rubber-band line extends from the vertex you clicked to the mouse cursor. Click a different vertex to create a seam, and then continue clicking vertices to create a seam from each vertex to the previous one. To start at a different point in this mode, right-click, and then click a different vertex. To stop drawing seams, right-click again, or click the Point-to-Point Seams button again to turn it off.

**TIP:** While Point-to-Point Seams is active, you can pan, rotate, and zoom the viewport at any time using contextual controls (middle-button drag, Alt+middle-button drag, turn mouse wheel, respectively) to access a different part of the mesh surface. You can also navigate using the ViewCube and SteeringWheels. After doing so, 3ds Max still remembers the last vertex you clicked and draws an accurate seam at the next click. Similarly, you can adjust the viewport using the viewport control buttons and then return to selecting the seam. If the control requires more than a single click, such as Pan, exiting the control by right-clicking in the viewport restores the rubber-band line, extending from the last vertex you clicked.

**TIP:** The algorithm Point-to-Point Seams uses to calculate a path might create a different seam than what you have in mind. If this happens, undo (Ctrl+Z) and specify the desired path by plotting points closer together.

**Convert Edge Selection To Seams**—Converts the current edge selection in the modifier to pelt/peel seams. These seams are added to any existing seams. Available only at the Edge sub-object level of the Unwrap UVW modifier.

**Expand Polygon Selection to Seams**—Expands the current polygon selection to the seam outline. If multiple seam outlines exist and each contains selected polygons, the expansion takes place for only one outline (based on the highest polygon ID); the rest are deselected. Available only at the Polygon sub-object level of the Unwrap UVW modifier.

**Projection rollout**

These controls let you apply and adjust one of four different mapping gizmos to a polygon selection.

**NOTE:** While one of the projection modes is active, you can edit the gizmo, but not change the selection.
Planar Map - Applies planar mapping to selected polygons.

Make a polygon selection, click Planar Map, adjust the plane gizmo using the transform tools and the Align Options tools, and then click Planar Map again to exit.

Cylindrical Map - Applies cylindrical mapping to selected polygons.

Make a polygon selection, click Cylindrical Map, adjust the cylinder gizmo using the transform tools and the Align Options tools, and then click Cylindrical Map again to exit.

**NOTE:** When you apply Cylindrical mapping to a selection, 3ds Max maps each face to the side of the cylinder gizmo that most closely matches its orientation. For best results, use Cylindrical mapping with cylinder-shaped objects or object parts.

Spherical Map - Applies spherical mapping to currently selected polygons.

Make a polygon selection, click Spherical Map, adjust the sphere gizmo using the transform tools and the Align Options tools, and then click Spherical Map again to exit.

Box Map - Applies box mapping to the currently selected polygons.

Make a polygon selection, click Box Map, adjust the box gizmo using the transform tools and the Align Options tools, and then click Box Map again to exit.

**NOTE:** When you apply Box mapping to a selection, 3ds Max maps each polygon to the side of the box gizmo that most closely matches its orientation. For best results, use Box mapping with box-shaped objects or object parts.

**Align Options group**

Use these controls for aligning the mapping procedurally.

**X/Y/Z** - Aligns the mapping gizmo to the X, Y, or Z axis of the object's local coordinate system.

**Best Align** - Adjusts the mapping gizmo's position, orientation, and scale to fit that of the polygon selection, based on the selection's extents and average polygon normals.

**View Align** - Reorients the mapping gizmo to face the active viewport and adjusts its size and position as necessary to fit the extents of the polygon selection.

**Fit** - Scales the mapping gizmo to the extents of the polygon selection and centers it on the selection. Does not change the orientation.

**Center** - Moves the mapping gizmo so that its pivot coincides with the center of the polygon selection.

**Reset Mapping Gizmo** - Scales the mapping gizmo to fit the polygon selection and aligns it with the object's local space.

**Wrap rollout**

You can apply regular texture coordinates to irregular objects using these tools.
**Spline Mapping**—Applies spline mapping to the currently selected polygons. Clicking this button activates Spline mode, in which you can adjust the mapping and edit the spline map.

**Unfold Strip from Loop**—Provides a fast way to unwrap geometry along a linear path, using the object’s topology. To use, select an edge loop parallel to the side to unwrap and then click this button. This can cause a significant scale change in the texture coordinates, so typically you would then use a Pack tool to bring them back into the 0 to 1 standard UV range.

**TIP:** Unfold Strip from Loop uses the Ring method to find parallel edges, so for best results use it on regular geometry. You can use the Ring function to see how it will find edges.

1. Original lofted object with default checker pattern applied and edge loop selected
2. After applying Unfold Strip From Loop (closeup view)
3. After selecting parallel edge loops with Ring UV and applying Space Horizontally (closeup view)

**Configure rollout**
Use these settings to specify modifier defaults, including whether and how seams appear.

**Display group**
These settings determine whether and how seams appear in the viewports:

- **Map Seams**—When on, mapping cluster boundaries appear in the viewports as green lines. You can change this color by adjusting the Display seams color.

- **Peel Seams**—When on, peel and pelt boundaries appear in the viewports as blue lines. For more information, see Peel rollout.

**Thick/Thin**—The display thickness setting applies to both pelt seams and map seams:

- **Thick**—Displays map seams and peel/pelt seams on object surfaces in the viewports with relatively thick lines. The line thickness increases when you zoom the view in and decreases when you zoom out. This is the default choice.

- **Thin Seam Display**—Displays map seams and peel/pelt seams on object surfaces in the viewports with relatively thin lines. The line thickness remains constant as you zoom the view in and out.

**Prevent Reflattening**—This option is used mainly for texture baking. When on, the version of the Unwrap UVW modifier automatically applied by Render To Texture, named, by default, Automatic Flatten UVs, does not reflatten the polygons. Also, make sure that both Render To Texture and the modifier use the same map channel.

**Normalize Map**—When on, scales the mapping coordinates to fit into the standard coordinate mapping space: 0 to 1. When off, the mapping coordinates are the same size as the object. The map is always tiled once in the 0–1 coordinate space; the part of the map based on its Offset and Tiling values on
For example, if you take a sphere of 25 units that's planar mapped from the top, and then apply Unwrap UVW and turn off Normalize Map, then when you open the editor, the radius of the sphere's mapping coordinates is 25 units. As a result, the texture map is tiled onto the sphere surface many times. With Normalize Map on, both the sphere and the map fit into the 0–1 coordinate space, so they're the same size.

In general, for best results, leave Normalize Map on. One reason to turn it off would be to turn it off is if you want to map several elements of different proportions with a texture of a specific aspect ratio, such as brick, keeping the texture the same size on each object.