

Course: *1029 – Texturing 1*

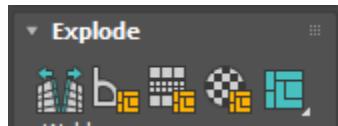
Week 2 – Stitching, Breaking and Utilizing UV Space

The goal of a successful unwrap is to minimize the amount of UV distortion on an object by ensuring that the distances between UVs in the UV Editor are relatively to the same scale as the vertices in 3D, allowing you to paint or assign textures to it that:

- Display correctly upon rendering in engine or in viewport
- Can be easily identified and manipulated in either 2D or 3D applications
- Make full use of available UV space

UV Unwrap Commands Overview – Stitch and Break

The tools used when unwrapping an object are comparatively more straightforward and fewer in number compared to other disciplines in 3D, since you are never creating or deleting information just manipulating it. The three simplest tools that can be used to complete an unwrap are Break (sometimes referred to as Cut), Stitch, and the basic transforms (move, rotate, scale).



Inside the UV editor window is the “Explode” rollout, with the commands running left to right being

Break – Convert a single interior edge into two pieces of shell border, the most straightforward and often used Edit UVs command/tool

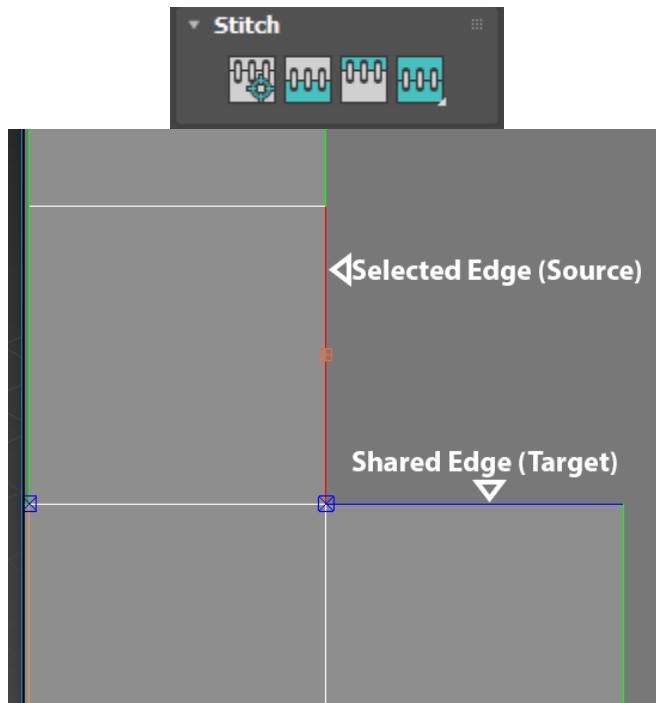
Flatten By Angle – Break polygons into separate shells based on the angle of intersection, this is obviously dependent on the construction of geometry for the object

Flatten by Smoothing Group – Break the mesh into UV shells based on the smoothing group applied to the geometry. This is based on a property of the mesh that is assigned when modeling.

Flatten by Material ID – Break the mesh into UV shells based on the Material ID assigned to the geometry, again typically done in the modeling stage.

Flatten Custom – Allows for use of the previous three flatten options in concert as well as making changes to how they operate, as is the most versatile of the Flatten options

Most unwrapping work that we do in class will be accomplished using the “Break” and “Flatten Custom” commands.



The Stitch rollout has four variations of the same function; converting two open border edges to a single interior edge by referring to the edge that you select as the “source” and the edge(s) that it is connected to on the model as the “target”. Going left to right:

Stitch to Target – Moves the UVs on the current selection to their blue

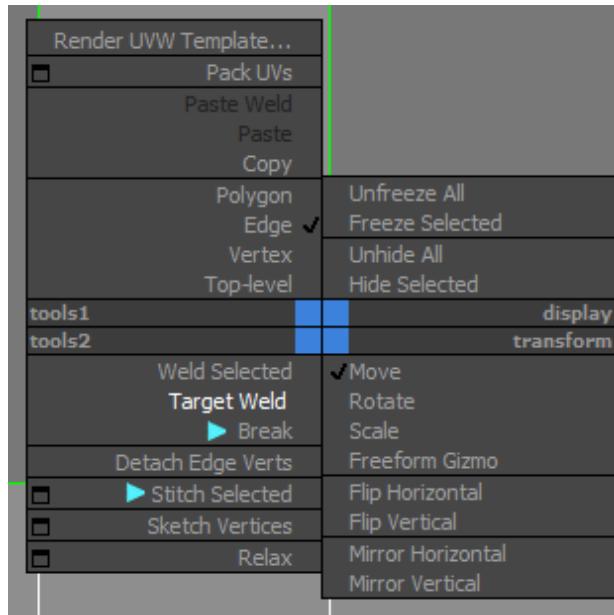
highlighted counterparts and then stitches the two border edges into a single interior edge

Stitch to Average – Moves the UVs of both the target and the source to the half-way point between their current positions, then performs the stitch

Stitch to Source – Moves the UVs of the blue highlighted counterparts to your selection then stitches the two border edges into a single interior edge

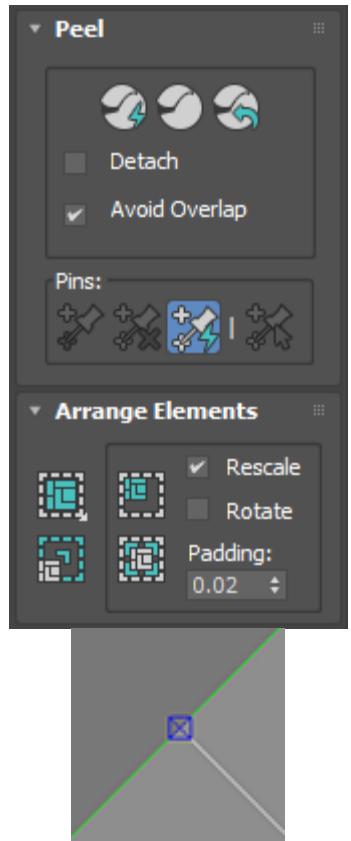
Flatten Custom – Performs “Stitch to Average” while also allowing for some additional options.

An easy way to approach the process of breaking and stitching edges is through use of the right-click Quad Menu when inside the Edit UVWs window (UV Editor) as shown below. The break command functions the same way as it would if selected from the command list on the right, and the “Stitch” command will perform a “Stitch Average”. The Quad-menu tools will give us results that we can use in conjunction with some more “automated” tools.



Automated Unwrap Tools

While they won't complete your work for you, these tools will give you a much better starting point for your unwrap with a little preparation.



Peel – The first option (with the blue lightning bolt) will perform a “quick peel” operation, which will have Max attempt to unwrap your UV shells in a way that minimizes any distortion. This can be applied to a single shell or to a selection of polygons. This is a typical go-to operation as soon as you have done any initial breaking or projection unwrapping. Something to note is that when you quick peel something, Max needs to have at least two vertices “pinned” and if you don’t have two pinned already it will choose two itself and pin them, indicated by the blue box with an X through it as seen on the left. This feature leads into the second function in the peel menu: **Peel Mode**.

Peel Mode when toggled on will essentially run a “live” peel command, meaning that as you move vertices and polys it will automatically adjust the mesh to attempt to maintain a distortion free unwrap, but will not move any vertices that have been pinned. Typically, when doing a hard surface unwrap this can be difficult to work with but is excellent when doing character unwraps. You can set pin behavior by using any of the buttons underneath the “pins” rollout.

The third option “reset peel” will convert the object back to its basic unwrapped state and is a quick way to reset your unwrap.

The two options that you are able to toggle on and off inside of Peel will allow you to “detach” any selected polygons from the rest of the shell when you run a peel operation on them, or have Max try to prevent overlap by *rescaling your selection as well as all the other shells currently visible*. Typically, this latter option is not something you want, and I typically work with it turned off.

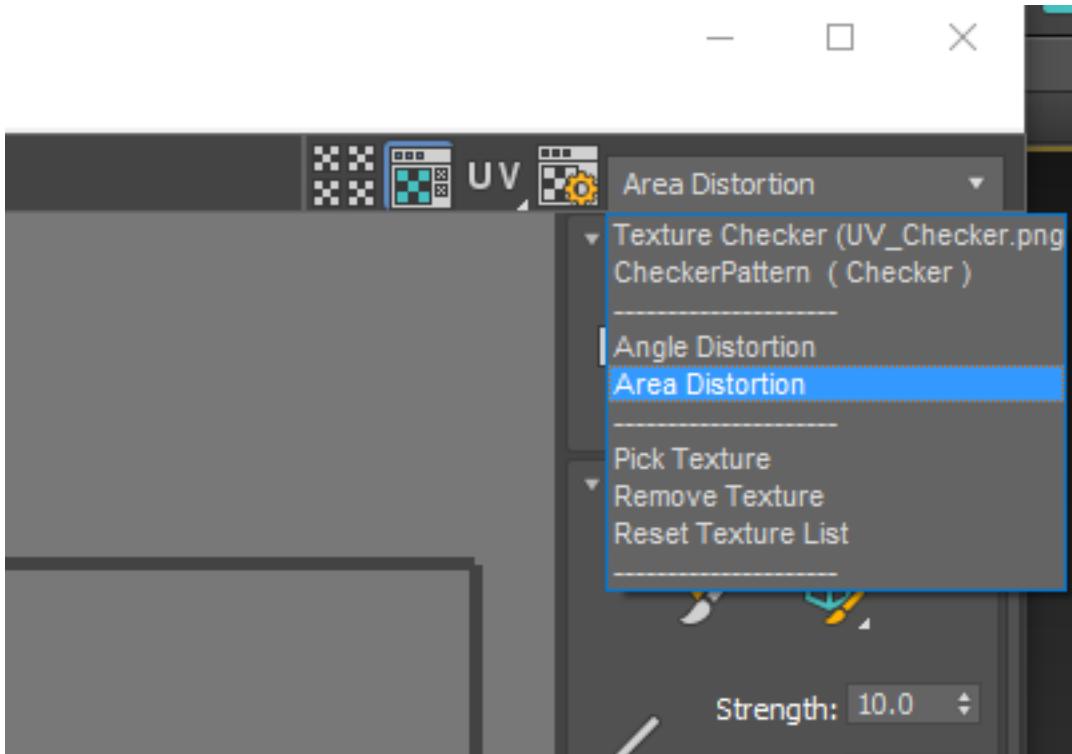
Some of the more common issues that can cause your peel operation to fail:

- Interior border edges - When your UV shell borders overlap interior edges, much as it did on the barrel. The simple fix is to go through the shell and move the border edges outside of the interior edges.
- Flipped UVs – Just as mesh has an inside and an outside, UVs can be flipped inside out as well.



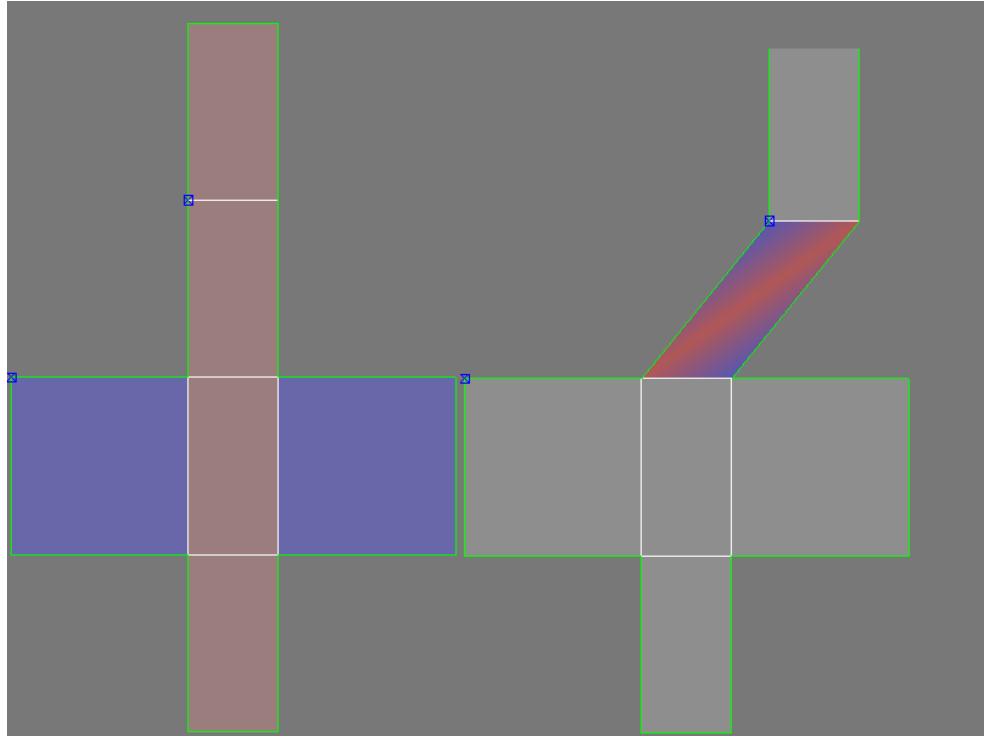
One more set of tools to point out is the “Reshape Elements” rollout, starting with “Straighten Selection” on the left. This does pretty much what you would expect: it tries aligning your vertices to the U and V axis. The second two options are variations on the “relax” command, which will attempt to get all of your selected vertices to be more evenly spaced. This is particularly useful if your initial projection mapping leaves you with a lot of overlap or you are working in a very densely packed area of mesh like a characters eye.

Utilizing UV space and common practices



Checking for UV Distortion

In addition to checking for UV distortion in the viewport, 3DS Max also can display what it believes to be UV distortion from inside the UV Editor window. If you go to the upper right dropdown menu inside the UV Editor, you will see options for “Angle Distortion” as well as “Area Distortion”. Toggling these on will have Max display a heat map on the UV window if UVs are starting to either skew (viewed through angle distortion) or be squashed or stretched (viewed through area distortion). You can see an example of each below, applied to an unwrapped 1mx1mx1m cube. In the first image Max is indicating that the surface area covered by the red faces is experiencing UV squash, while the image on the right indicates a left-right skew.



When to break shells apart

While not always necessary, there are times when breaking a single shell into two or more smaller shells can be advantageous. The most common or easily read cue that the shell can be separated is an actual seam or change in material with the mesh, just as we did with the barrels metal hoops in class. Other instances would be the windshield or canopy of a vehicle, the lift and control surfaces of an aircraft, or the paneling (door, hood, roof) of a ground vehicle. These are the same cues you look for when modeling. Word of warning; remember that even with the use of a 3D paint tool, painting across shell borders can create its own set of complications.

Some examples of areas where you would be breaking the mesh apart both as separate UV shells and/or separate elements in the model.



When to overlap shells

If two UV shells are completely identical and will be receiving the **exact** same texture, then they can be overlapped to save space as well as speed up the texturing process. There are some major drawbacks and issues to be aware of when overlapping UVs however, the first being that the two pieces should be identical, paying attention to areas that have directional information (so a defined front vs back, left vs right) and when using textures that include text. A slight offset on one piece will cause issues when creating your pixel bleed/padding, the text can appear backwards and it can also limit your options for creating the texture; since the shells are overlapping, unique details such as scrapes, scratches or facial features like freckles, beauty marks and moles appear in the exact same spot on the other shell which if the player notices it has much the same effect as noticing a tiling pattern: it advertises that you are playing a game and to a certain degree breaks your level of immersion.

