NEW YORK CITY
COLLEGE OF TECHNOLOGY
THE CITY UNIVERSITY OF NEW YORK

DEPARTMENT OF ARCHITECTURAL TECHNOLOGY

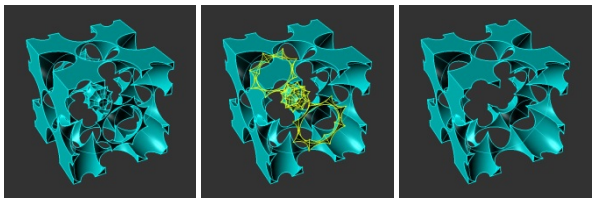
ARCH1291– Visual Studies II
Assignment 5: Pavilion Design
Part A: Paneling Tools

INTRODUCTION

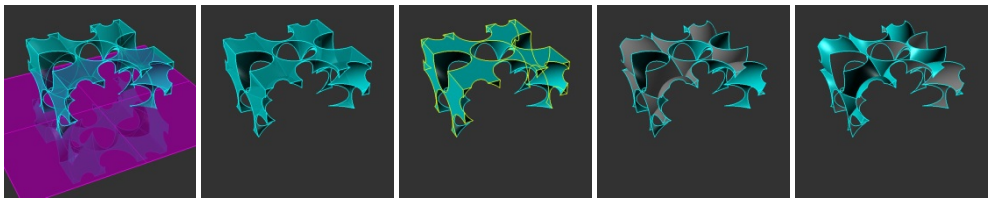
This assignment will integrate concepts learned in Assignment 1, which dealt primarily with Rhino primitives and Boolean operations, and Assignment 2, which dealt with NURBS surface exploration, in order to create a series of "panelizations" utilizing the Paneling Tools plug-in for Rhino. You will edit your Assignment 1 models to create a polysurface resembling a vaulted structure, and then populate this across surfaces you created in Assignment 4 using Rhino's Flow Along Surface command and the Paneling Tools plug-in. The result is an array of vaulted bays that will form the basis of your pavilion design.

INSTRUCTIONS

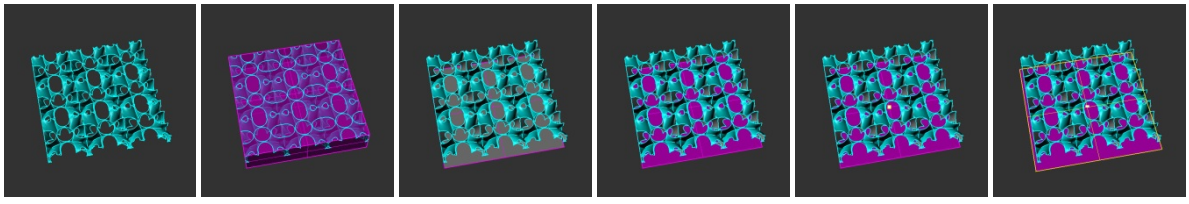
1. Select a form from your Assignment 1 cube model that has the most dynamic interior space. You are encouraged to select as many forms as you'd like should you deem them worth pursuing. Delete any "loose fragments" of the model (polysurfaces that are not contiguous with the main form).



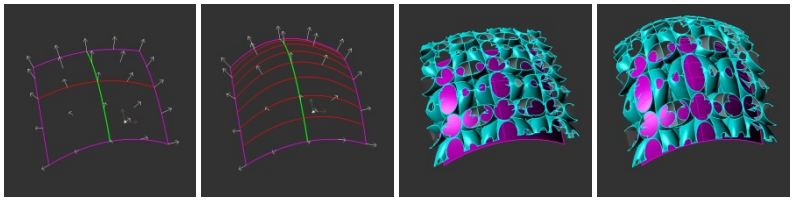
2. Using the **cutPlane** and **trim** commands, trim your model so that it resembles a series of columns leading upward to a vaulted ceiling. Typically the trim will occur near the center of your cube model on an XY plane, though this depends entirely on your particular form.
    a. Use the **extractSrf** command to extract and delete any trimmed surfaces from the original cube polysurface. You will find that your polysurface is now "inside-out" – use the **dir** command to flip the surface normals.



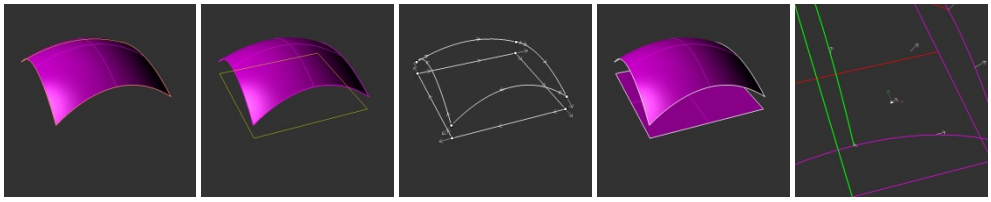
3. **Array** the polysurface into a 3 x 3 grid on an XY plane. Since the original cube measured 10", your X and Y spacing will both be **10**.
    a. In order to get base plane for the polysurface, create a **boundingBox** around it. Then extract the bottom surface of the resulting box and delete the rest of the box. Flip the base plane's surface normal direction.
    b. We want the base plane to be slightly larger than the arrayed polysurfaces to avoid badly formed surface edges at points of infinite surface curvature. Take the **areaCentroid** of the base plane then use the resulting centroid point to **scale** the base surface by a factor of **1.05**.



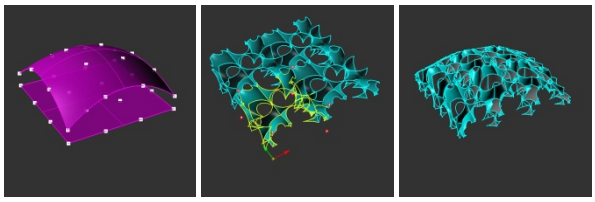
4. Open your Assignment 2: Surface Study file and copy (**ctrl+c**) the surface from edge curves and the swept rail surface from the step in which you matched their UVW directions. Paste (**ctrl+v**) these two surfaces into your Assignment 3 file and scale them by a factor of 3 so that they match the size of the polysurface array (this is not necessary but it helps visually). These will be target surfaces for the **flowAlongSrf** command. Make extra sure that the surface UVW directions match between your base surface and your two target surfaces.
    a. Flow the polysurface array along the surface from edge curves.
    b. Flow the polysurface array along the swept rail surface. Take notice of the difference in results. These differences are caused by the form of the surfaces as well as the surfaces' differing isocurve spans.



5. The flow along surface command in Rhino limits us to populating components on the top of a single surface. We can use the Paneling Tools plug-in for Rhino to allow us to populate components between two surfaces which will act as the floor and the ceiling guides for our pavilion designs.
    a. Use the surface from edge curves as the ceiling surface.
    b. Create a floor surface by duplicating the edge curves of the surface (**dupEdge**) and projecting them to the default XY CPlane (**projectToCPlane**).
    c. Match the curve directions of the projected curves with those of the duplicated edges. Then use the **edgeSrf** command to form the floor surface.
    d. Make sure that the surface UVW directions match between the floor and ceiling surfaces:
        i. Run the direction command to make sure that the surface normals are pointing in the same direction.
        ii. Use UV isocurve coloration in a wireframe viewport to match U and V directions relative to one another.
        iii. One more thing – while in the direction command hover your mouse over each surface. You will see a tiny coordinate system with a red and green axes corresponding to your UV directions – these coordinate systems must also match! If either axis is pointing the wrong way, click the **UReverse** and/or **VReverse** options to correct it.



6. To panelize the surface you will first need to create point grids. Go to **Paneling Tools > Create Paneling Grid > Surface Domain** and select your floor surface.
    a. Repeat the command for your ceiling surface.
    b. To populate the point grids with your polysurface component, go to **Paneling Tools > Paneling from Grid > Panel Custom 3D**.
    c. When you are asked for 2 bounding surfaces press Enter for none.
    d. When you are asked to select objects do not select your entire polysurface array – just select one polysurface.
    e. Rhino will preview the adjacencies of the panelization – make sure that the **X Length** and **Y Length** options are both set to 10, then press Enter to accept.



GRADING

To receive a grade, your Rhino (*.3dm) files for Assignment 3 (Parts A and B) must be submitted to your Dropbox folder the beginning of the next class.

Assignment 5 Part A will be graded as follows:

1.	File named properly and good layer management	10%
2.	Correct manipulation of Assignment 1 polysurface into vaulted bay component	10%
3.	Polysurface component has correct UVW directions and is arrayed properly	10%
4.	Clean array of polysurfaces (edges of polysurfaces align properly)	10%
5.	Correct surfaces from Assignment 2 with matching UVW directions used as target surfaces	10%
6.	Successful completion of two flow along surface commands	10%
7.	Correct formation of floor and ceiling surfaces	10%
8.	UVW directions of floor and ceiling surfaces match	10%
9.	Successful completion of paneling grid from surface domain.	10%
10.	Successful completion of Panel Custom 3D tool	10%

Assignment 5 Part B instructions and grading rubric forthcoming…