HOLIDAY LAMP

ARCH 678| ADVANCED CONSTRUCTION

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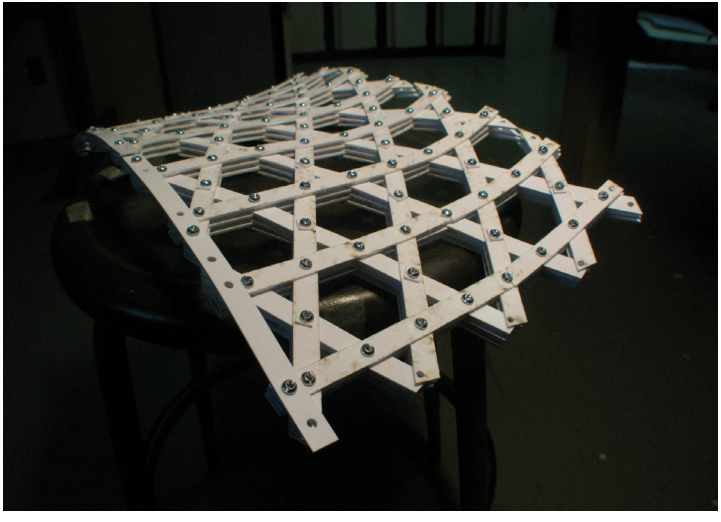
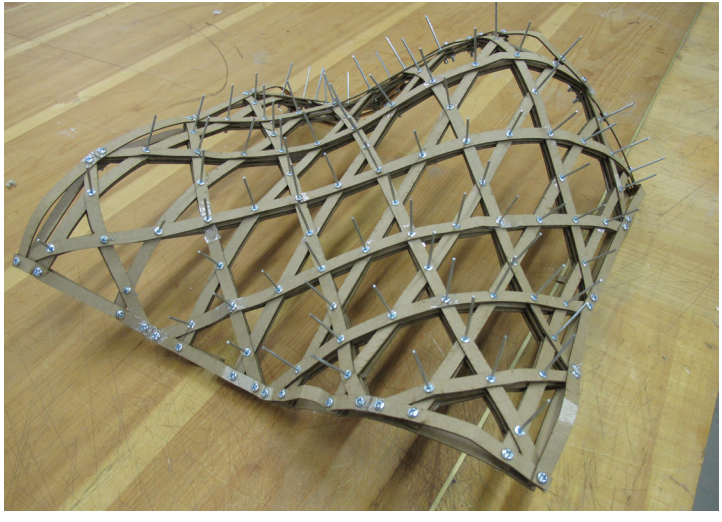
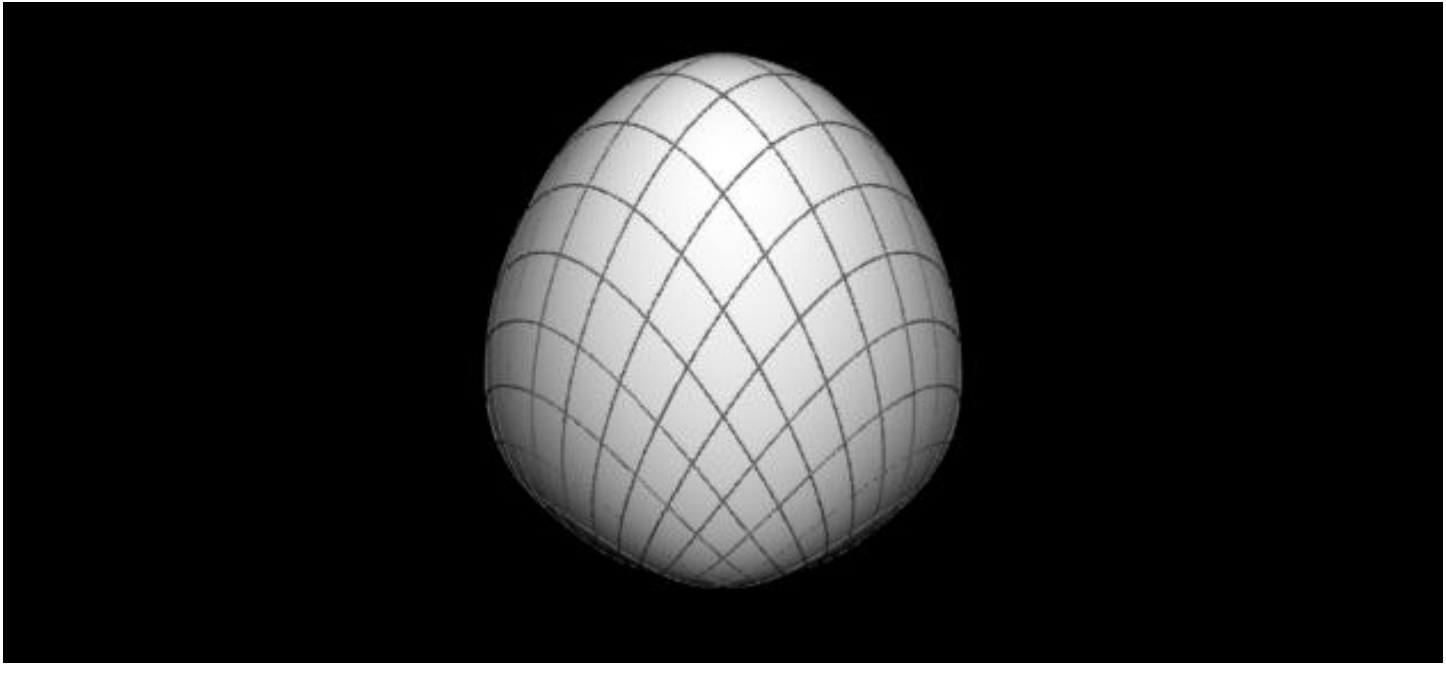
PREVIOUS MODELS



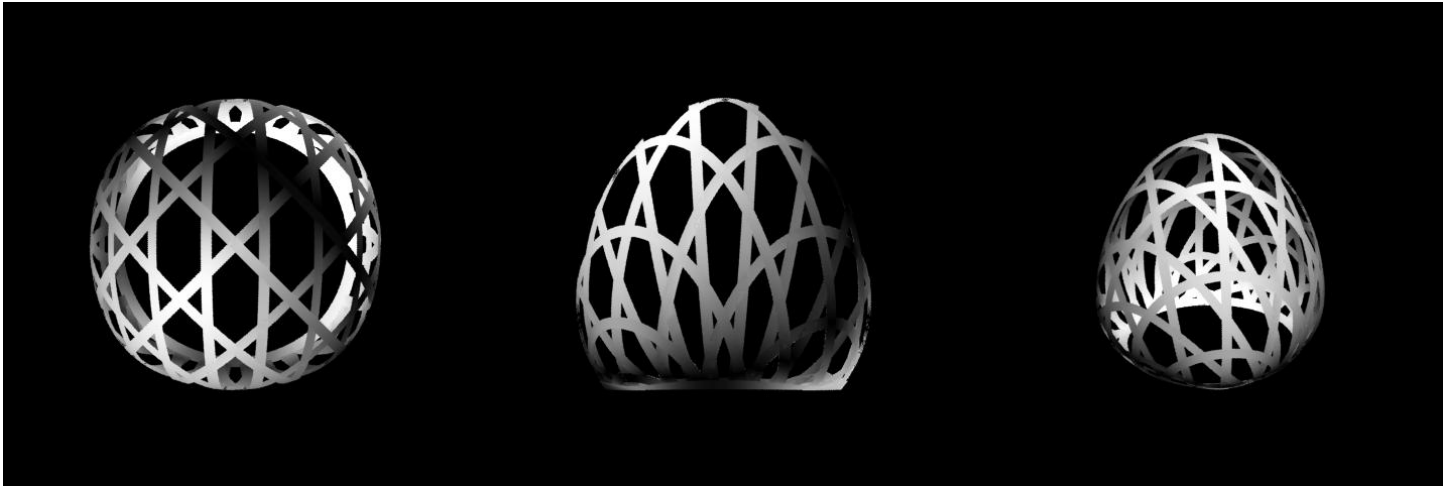


ORIGINAL SURFACE



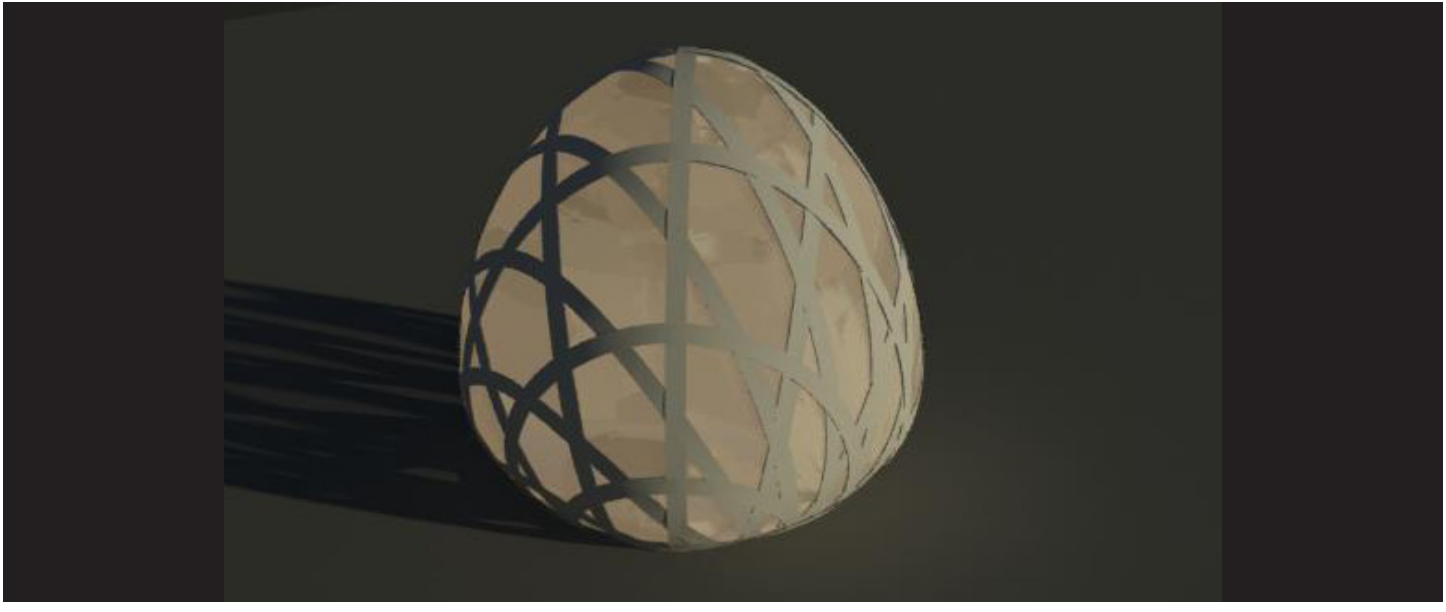
We chose to make a lamp using a closed shell surface. We thought it would be a challenge to have a circular base, rather than a rectagular base. The base is composed of four quarter circles in order to create the uv coordinate system as the image above shows.

RHINO MODEL: GRIDSHELL



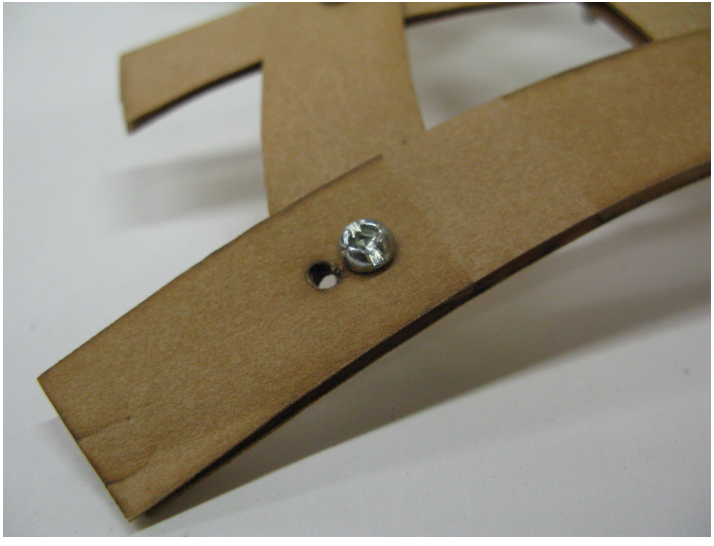
The symmetrical surface was very useful in the fabrication process, making the order of assembly straightforward.

RHINO MODEL: PAPER STRIPS



A preview of the lamp which uses tracing paper to diffuse the light.

MOCK-UP

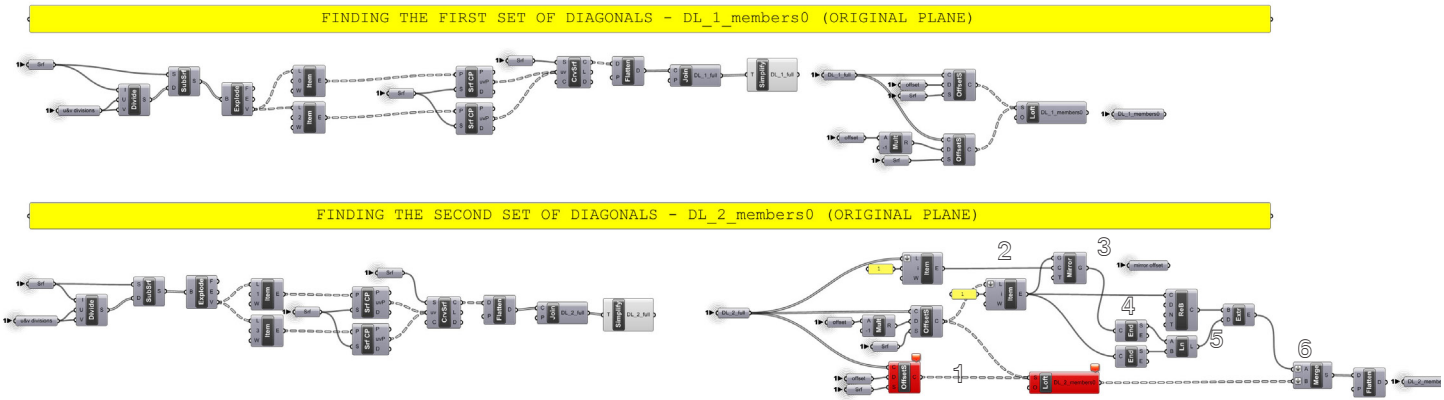


The mock-up of an edge of the lamp demonstrated there were challenges ahead. The unrolling flipped the pieces in the wrong way, which was fixed for the final object. The edges met flush where the holes were split. A problem which was fixed in the script to make the edges overlap. And finally, certain holes were too close to fit the bolts next to eachother. A script was added to fix that problem.

SCRIPT

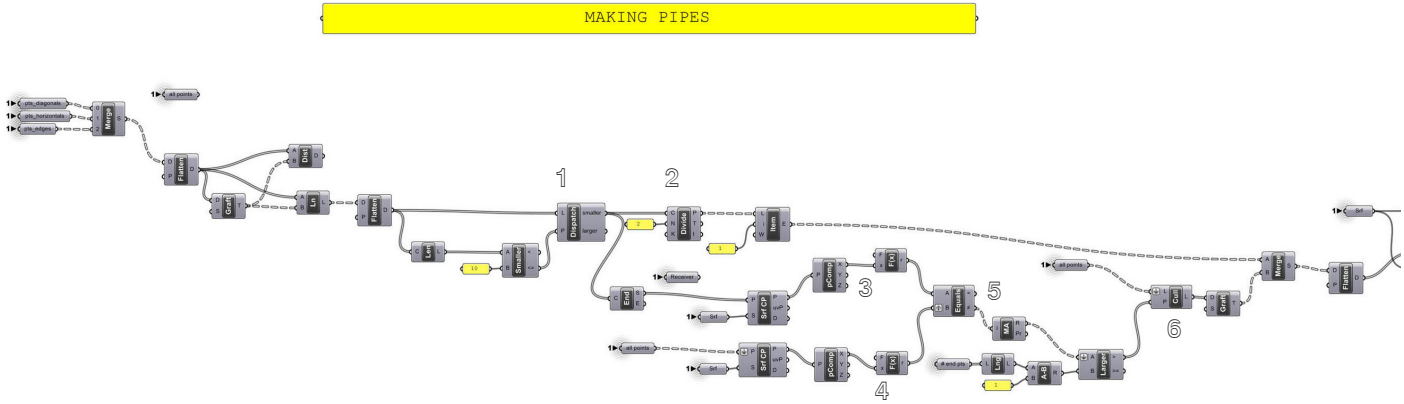
Two significant changes were made to adapt the script that had been used previously to this particular project. The first one (A) was to fix a problem related to how the surfaces was generated. The second one (B) was an addition to avoid having holes too close together.

SCRIPT DETAIL A



Since this was a non-developable surface, one line of the second set of diagonals was not offsetting in one of the directions (1). In order to remedy that problem, we simply used the offset edge that worked for that curve (2), and mirrored it (3). Then we found the start point for both the original offset and mirrored curve (4). The original offset curve was extruded along the line that was drawn between the two start points of each curve (5). Finally, we had to merge this extrusion with the other set of lofts (6).

SCRIPT DETAIL B



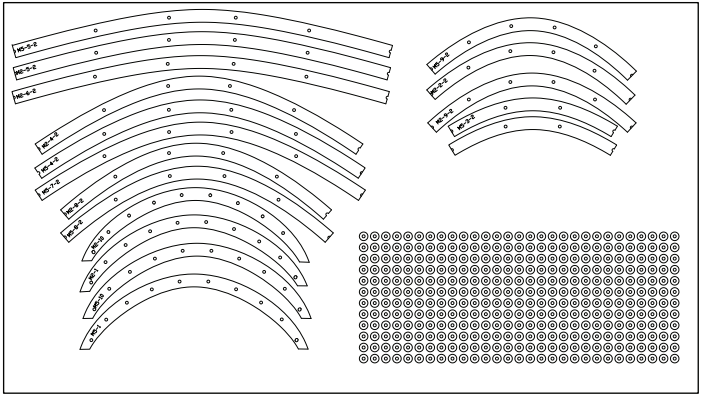
In order to fix the problem where some holes were too close to one another, we added a script that would replace those pairs of holes with a single one midway between the two.
Lines were drawn from each point to every other point, and only those which were longer that 10 mm were kept (1). In the original list of points used to locate the holes, as list with the points corresponding to the midpoints of these lines was added (2) and a list of points with all the endpoints of theses lines was removed. To remove the points, a comparison was set up between each of the points in the original list (3) and the list of points to be removed (4). This created a data branch for each point in the original list (5). Trues and falses were treated as numerical values, and only the branches containing only trues were kept (6).

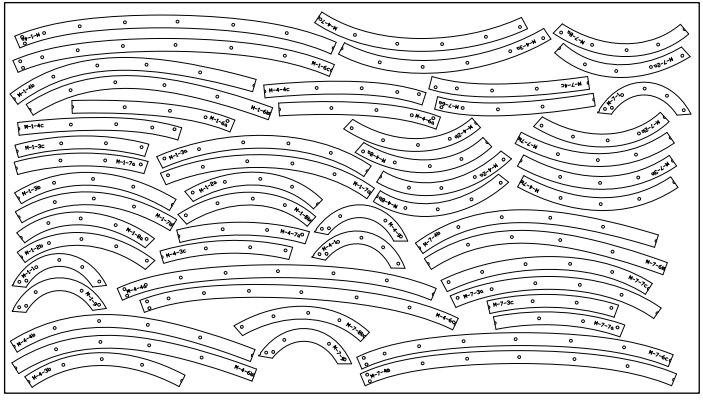
BUDGET

Veneer	=	48$
Bolts	=	13$
Double sided tape	=	7$
Mdf base	=	2$
TOTAL	=	70$

Other materials (cost not included)
Super glue
Masking tape
Cardboard
Tracing paper
Lights and electronics

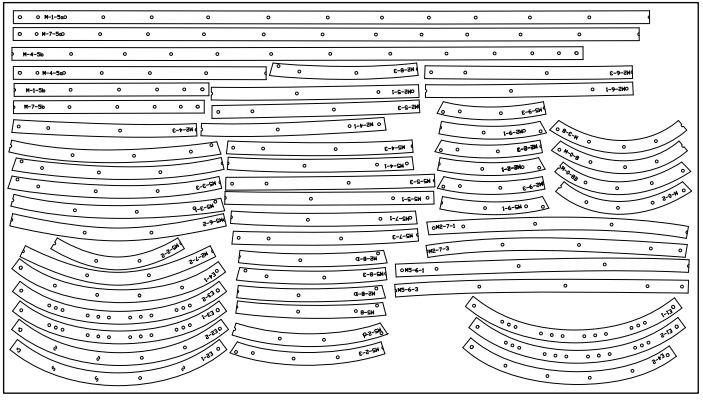
VENEER LASER CUTTING

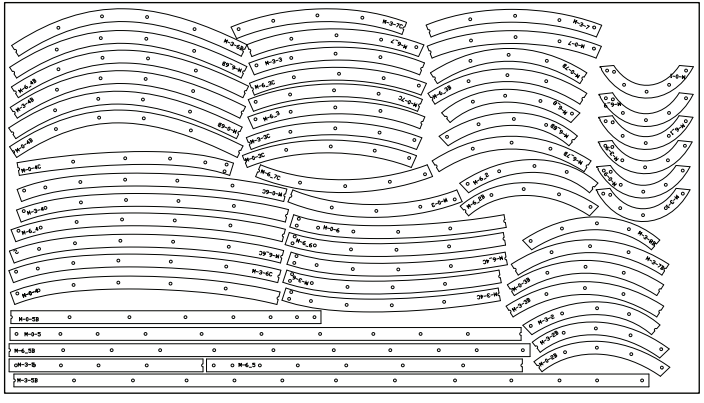




In order to reduce difficulties in fabrication and the complexity of the object's curvature, splices were not included in the script. However, to work within the budget constraints (reducing the amount of fabrication sheets required and waste) and due to the limitations of wood veneer, we had to add splices to the strips manually after the unrolling process. The splicing also helped keep the grain running along the length of the strips when they were too curved.

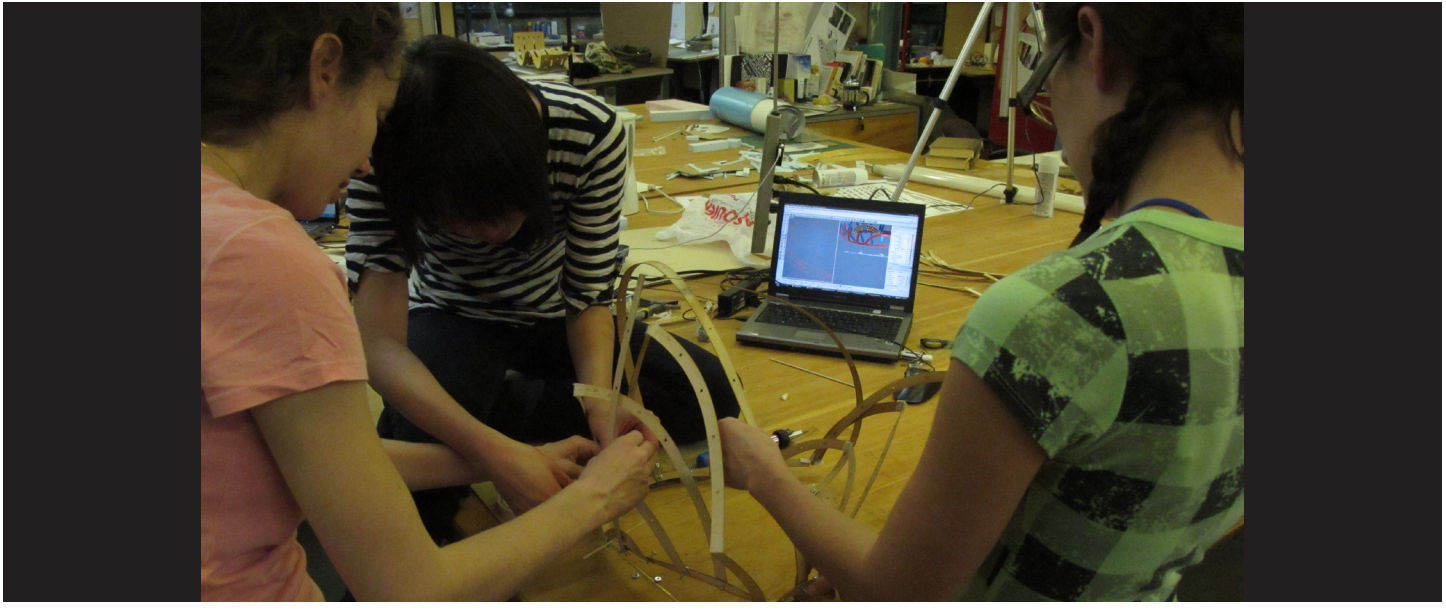
VENEER LASER CUTTING





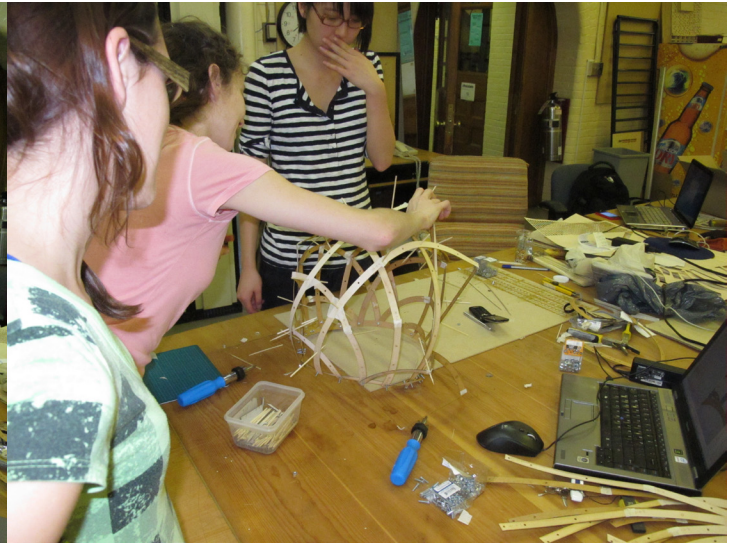
The splices were made manually after the members had been unrolled. This caused problems in locating the splices on the different layers, which resulted in the overlapping of certain splices causing difficulties during assembly. During laser cutting, holes were wobbly and smaller than what had originally been planned, considering we had increased the size of the holes in consequentially, because we knew the real size would be smaller. At least they were not so small that the bolts could not fit in, they just created better friction in holding the pieces together.

BUILDING PROCESS_1: BASE



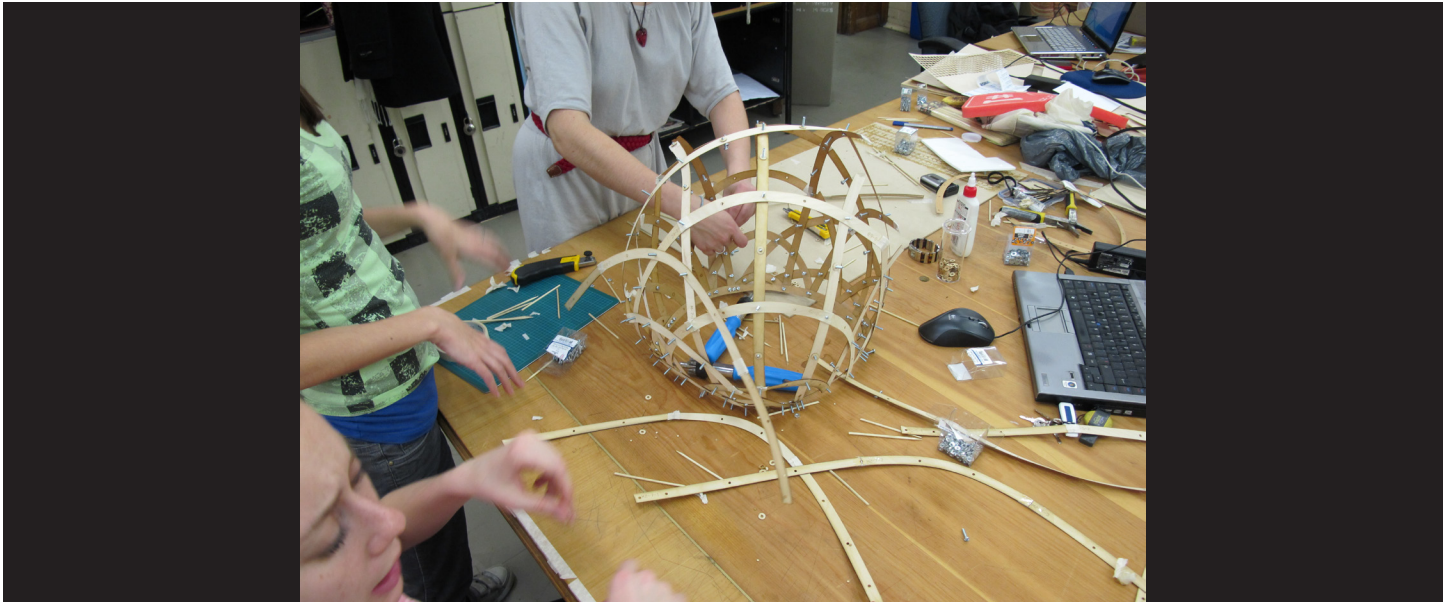
The fabrication consisted in connecting the inward-most edge together and then connecting the diagonal members from that. The assembly then worked its way outwards, one layer at at time.

BUILDING PROCESS_2: SKEWERS



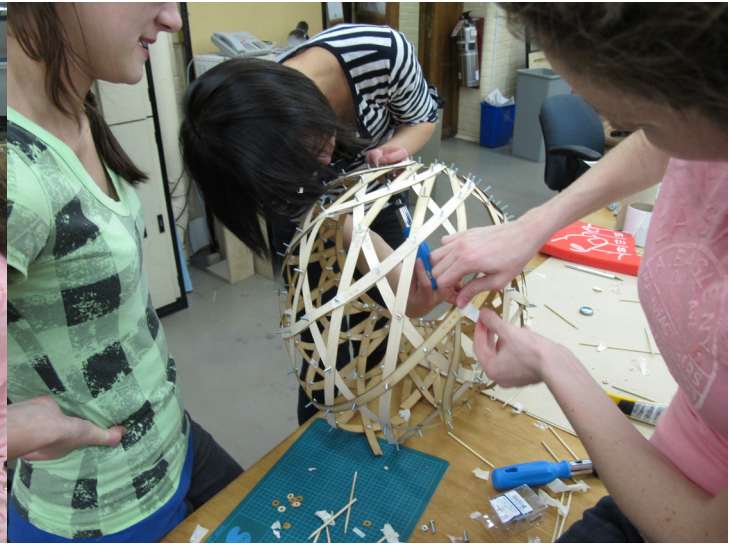
The beginning of the assembly process was difficult because the shape would not support itself until the two sets of diagonals were put in place. Skewers were used at first to try to keep the pieces together, however there was insufficient friction for them to stay in place.

BUILDING PROCESS_3: BOLTS



Finally, we decided to put in the bolt heads facing towards the interior of the shell and rejected the idea of making them face outwards after assembly as the process to remove each bolt and replace them in the right direction would be time consuming and unnecessary. In the end, we were happy to have the bolt ends facing outwards as this simplified the affixing of the tracing paper strips.

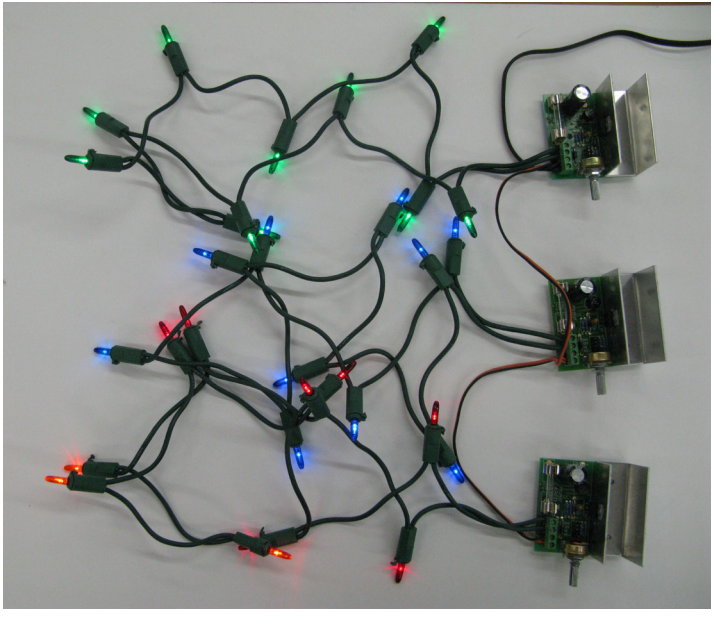
BUILDING PROCESS_4: BUILDING UP

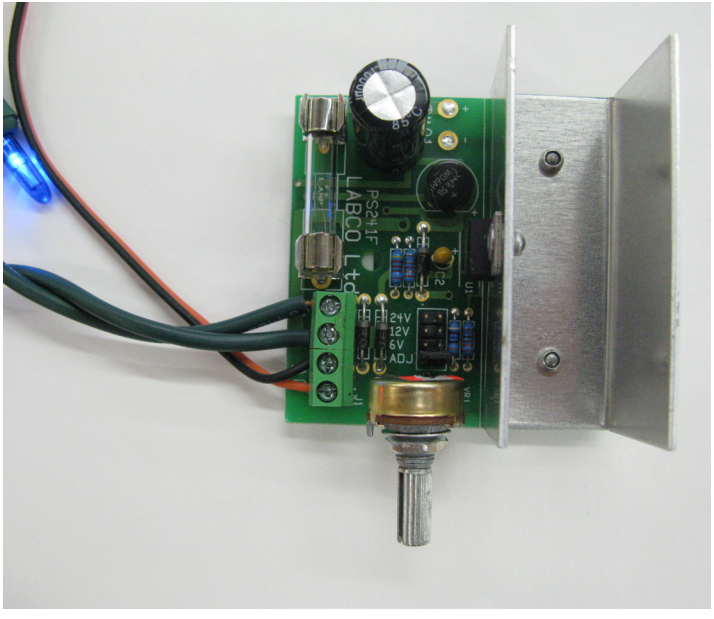


While we were adding up the layers, we needed glue and tape to maintain the overlapping splices in place. Especially since the curvature of the object tended to push the strips outwards. Strips of paper with holes punched in were also used to glue the splices on the inward-most layer which kept falling apart, even with the use of washers.

BUILDING PROCESS_5: FINAL SHELL

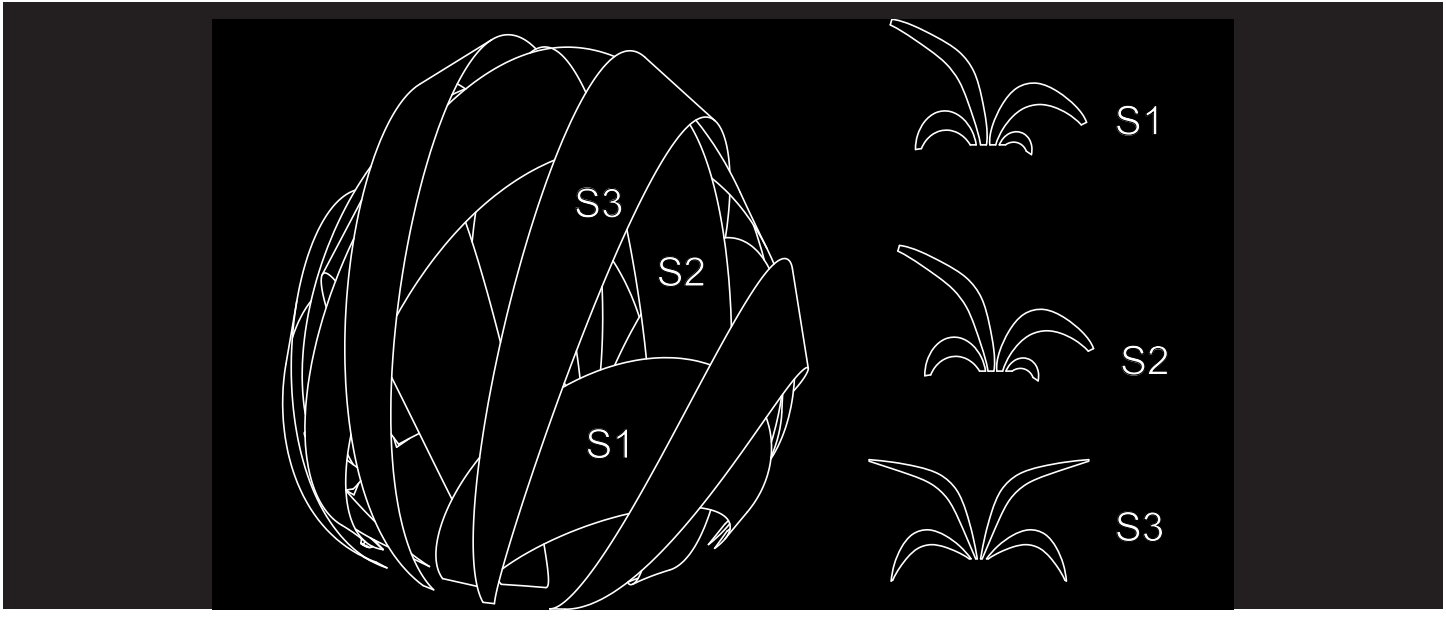
LIGHTS





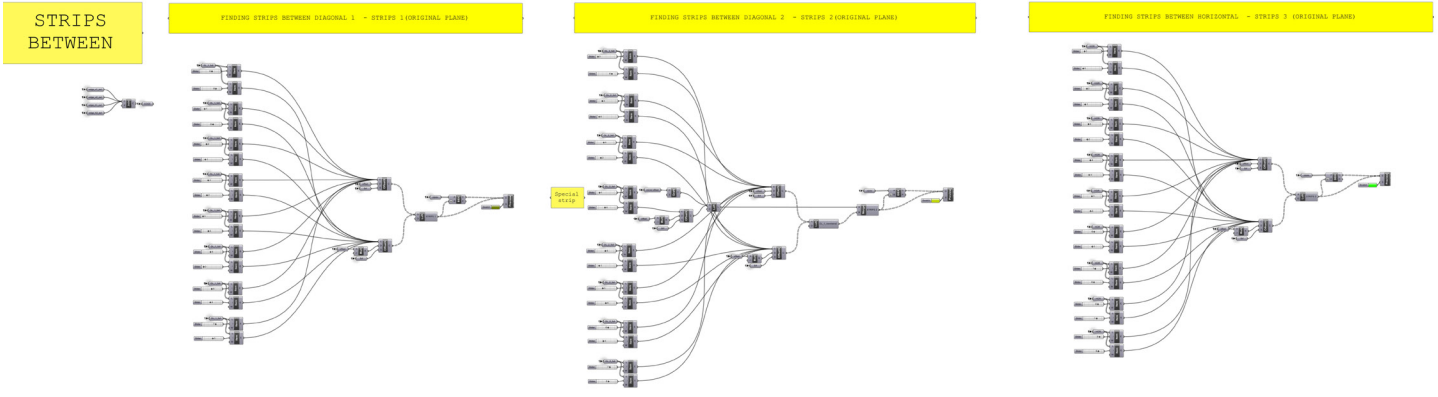
LED Lights were wired on three separate circuits containing red, green and blue LEDs respectively. Each circuit is powered through a potentiometer, controlling the amount of current each colour receives. The colour of the lamp can thus be controlled by dimming each colour accordingly.

PAPER STRIPS



Tracing paper strips had to be added in the intermediate spaces between the structural veneer strips. Not all the intermediate spaces were covered, so that there would be varying opacities with the overlapping of these layers. The paper strips were added last, on the interior of the shell.

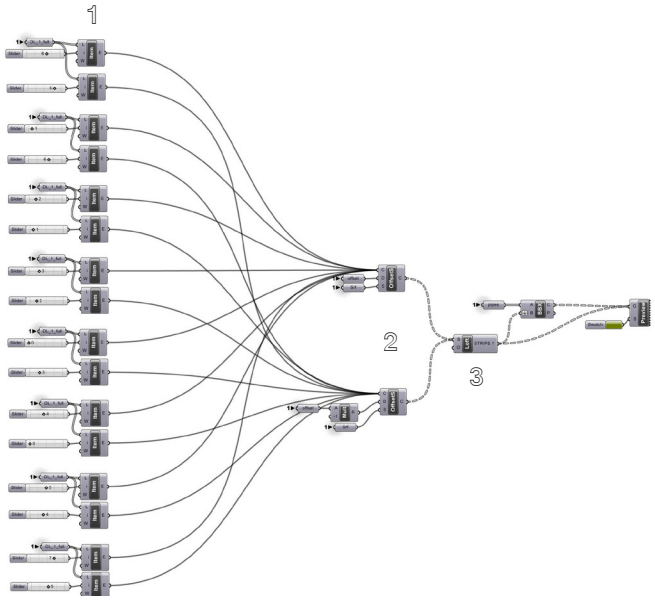
PAPER STRIPS: SCRIPT



A script was used to determine the shape of the intermediate spaces so that these could be unrolled and fabricated. Each strip was scripted and those that would be fabricated were selected later on during the unrolling process.

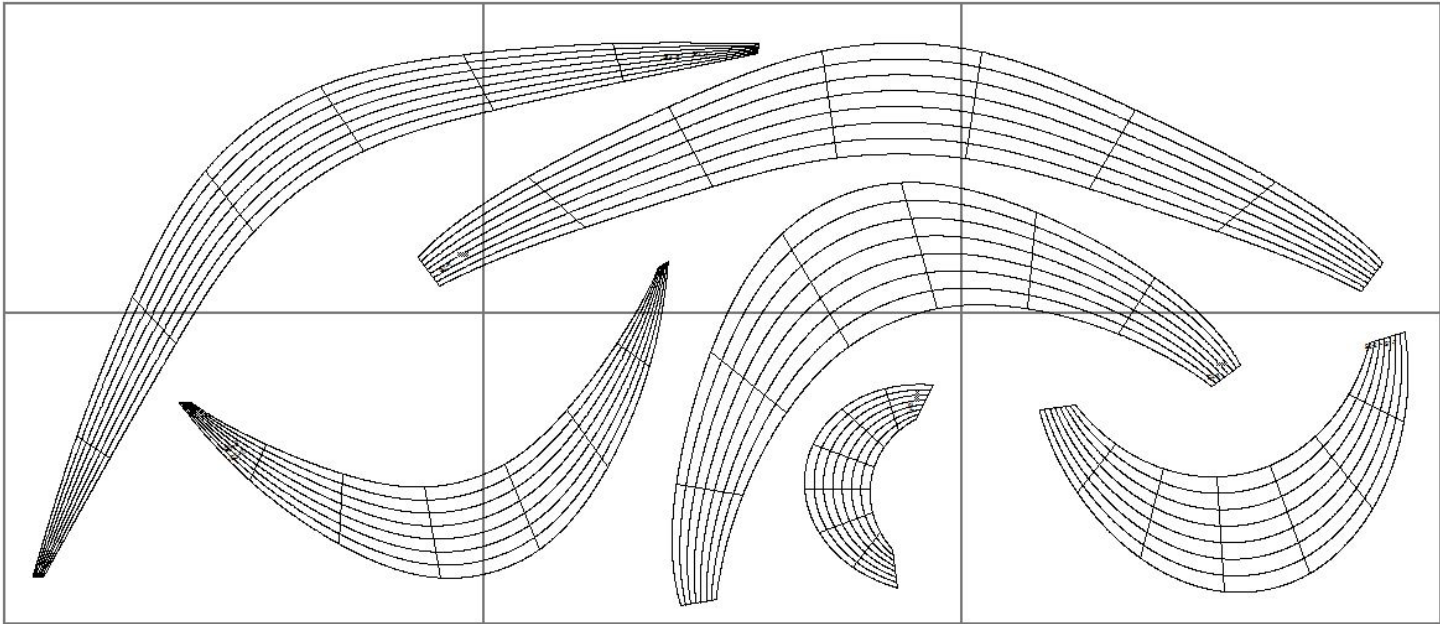
PAPER STRIPS: SCRIPT DETAIL

FINDING STRIPS BETWEEN DIAGONAL 1 - STRIPS 1(ORIGINAL PLANE)



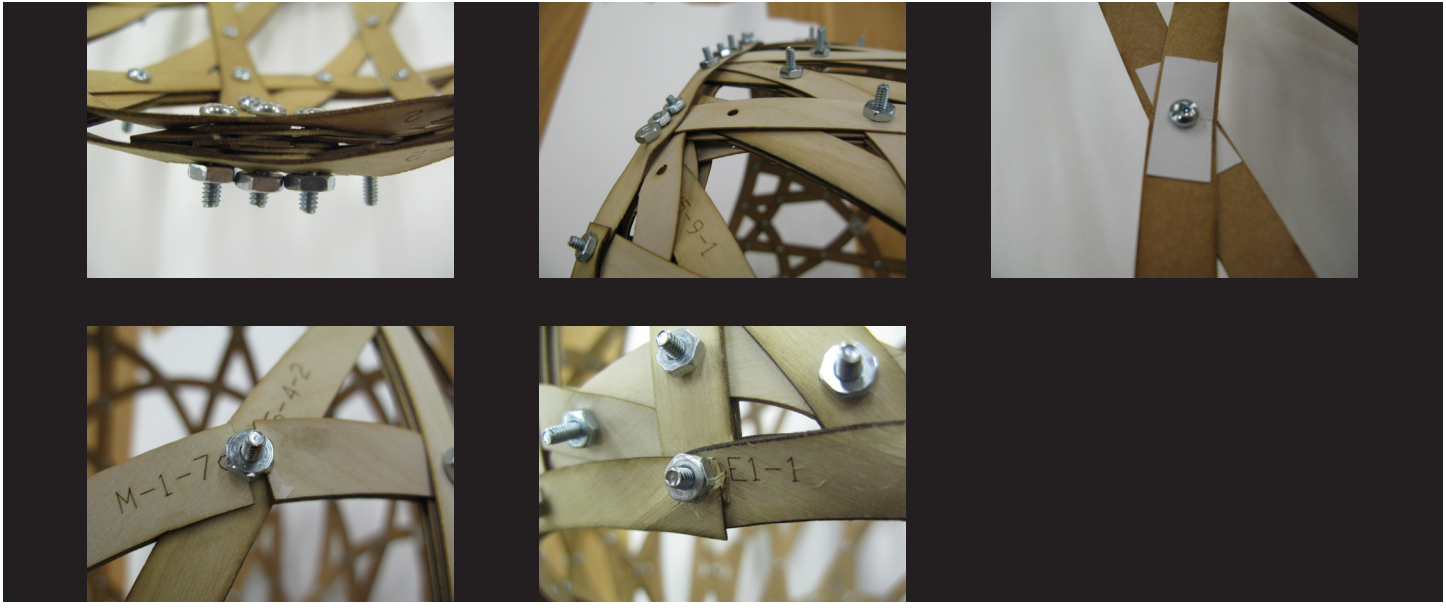
We had to loft the offsets of each opposing diagonal to create the surface in between the gridshell strips. In order to do that, we had to find the item which corresponded to right diagonal (1) and then offset them in both directions (2). We then loft the opposing offsets together (3).

PAPER STRIPS: UNROLLED



The selected strips were unrolled for printing purposes on 6 11x17 sheets of paper. These would then be reproduced on tracing paper manually. Due to the symmetry of the surface, we did not need to print every piece, therefore saving on paper.

PROBLEMS IN FABRICATION



In some instances there was not enough room to place the necessary spacers and keep the members on their respective layers. Uneven behavious of the material resulted in misalignment of holes and made some joints impossible to work with.

THE MARVELOUS FINAL RESULT

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