

LATTICE LAMP PROJECT

ARCH 678 - ADVANCED CONSTRUCTION - FINAL PROJECT
TO: MARIA MINGALLON

MARYSE BARRETTE-PARSER
CHI YUN (QUEENIE) CHAU
BAHARAN KHOSRAVI
OLIVIER PELLERIN
GIULIA SAN GREGORIO
KHANH LINH TRUONG



SCRIPTING

SCRIPTING

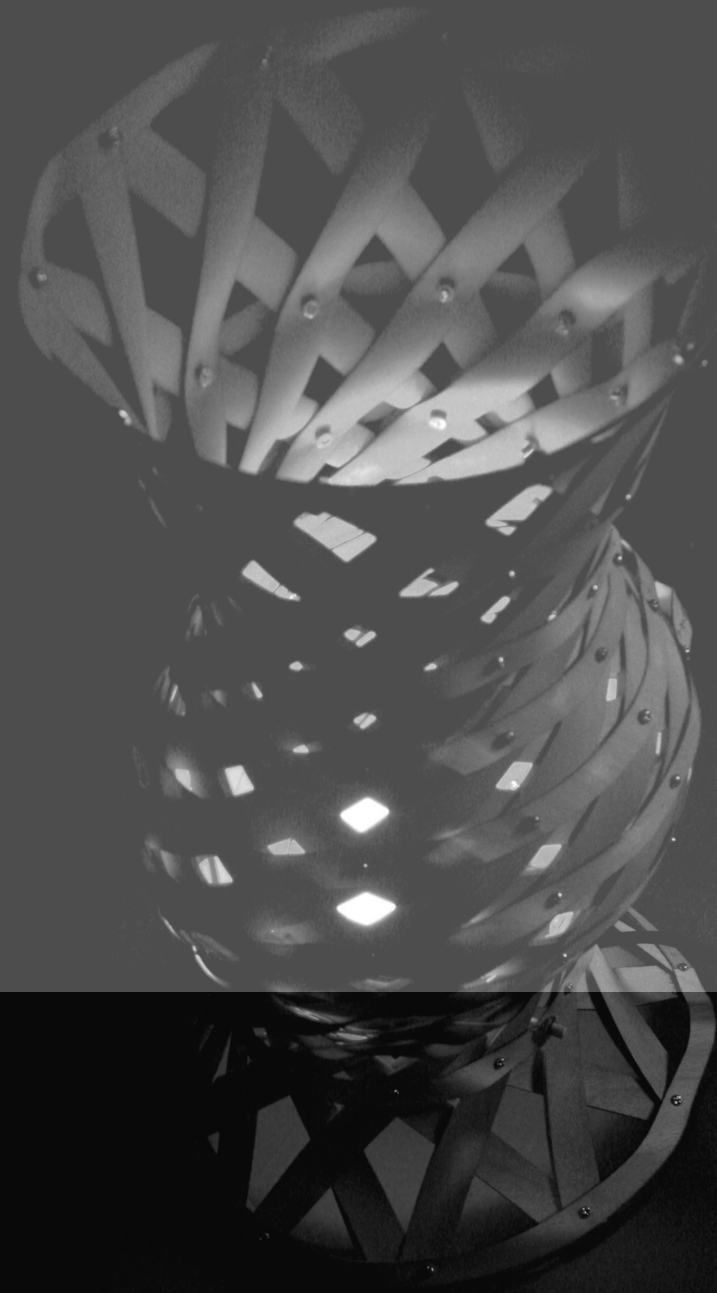
ONE OF THE PRIMARY OBJECTIVES WE HAD AT THE BEGINNING OF THIS EXERCISE WAS TO CREATE A SHAPE FOR THE LAMP THAT WAS A CLOSED AND CONTINUOUS SURFACE.

OUR FIRST APPROACH CONSISTED IN RUNNING THE LATTICE SCRIPT FROM THE FIRST ASSIGNMENT ON A CYLINDRICAL SHAPE. WE DISCOVERED THAT THIS WOULD NOT WORK CONSIDERING THAT THE CURVED SURFACE OF THE CYLINDER IS ACTUALLY A CONTINUOUS SURFACE WITHOUT ANY STARTING OR ENDING POINTS MAKING THE SUBDIVISION OF THE SURFACE INTO SURFACES IMPOSSIBLE.

TO SOLVE THIS ISSUE, WE DECIDED TO CREATE A SIMILAR CYLINDRICAL SHAPE WITH A DEFINED EDGE THAT WOULD BE BOTH THE STARTING AND ENDING POINT OF THE LATTICE.

THE FOLLOWING PROBLEM APPEARED WHEN WE TRIED TO LINK ALL THE SMALLER SEGMENTS [0;2] AND [1;3] TO CREATE THE LONGER STRIPS: THE CURVES HAD A HELIX PATTERN AND WERE TWISTING UP ALONG THE BASE SHAPE.

THIS MEANT THAT ALL THE INTERPOLATED CURVES BUT ONE WOULD ACTUALLY HAVE TO "JUMP OVER" THE STARTING EDGE IN ORDER TO JOIN ALL THE POINTS AND COMPLETE THE HELIX. WE SOLVED THIS PROBLEM BY CREATING A SEPERATE SERIES FOR EACH OF THE INTERPOLATED CURVES THAT SELECTED THE DESIRED SUBSURFACES THAT HAD TO BE LINKED TOGETHER FROM BOTH SIDES OF THE INITIAL EDGE.





THE SAME STRATEGY WAS THEN USED FOR THE HORIZONTAL STRIPES USING THE SEGMENTS [0,3] OF THE SUBSURFACES.

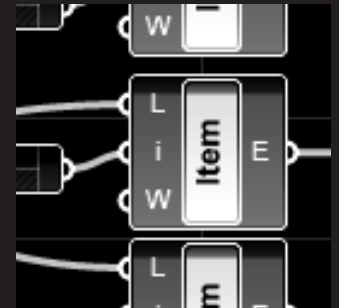
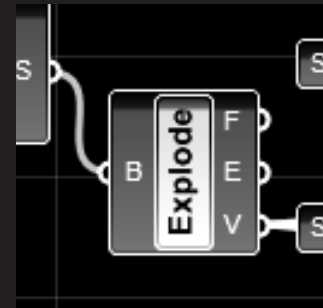
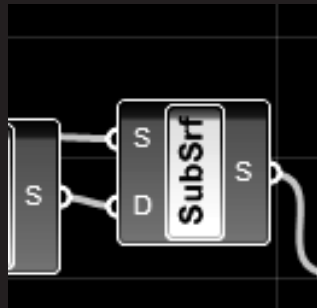
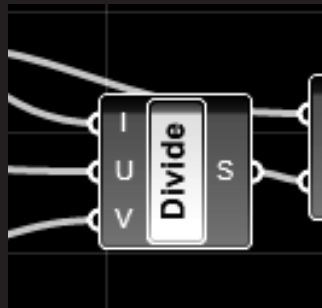
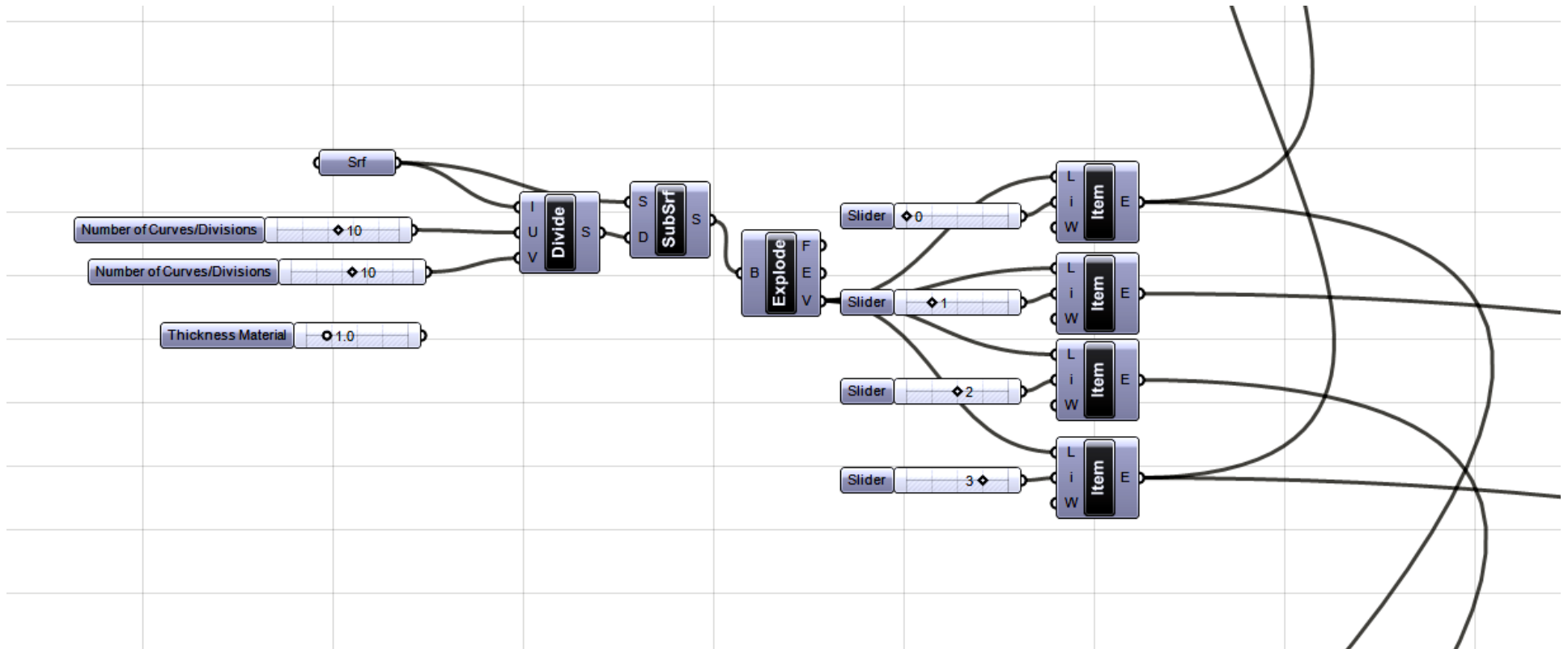
THESE STRIPS HAPPENED TO BE TOO LONG IN THE FINAL PRODUCT. THIS IS THE REASON WHY THE LAMP HAS UNDULATING HORIZONTAL STRIPS AND IS DUE MAINLY TO THE DOUBLE CURVATURE OF THE OVERALL SURFACE. WE HAVE A SHAPE THAT IS SIMILAR TO A SPHERE IN THE MIDDLE OF THE LAMP. FIRSTLY, THE VENEER IS A UNIDIRECTIONAL MATERIAL AND CANNOT BE CURVED IN TWO WAYS, IT IS A LAYERING MATERIAL WHICH IS NOT MALLEABLE ENOUGH FOR THESE TYPES OF SHAPES. SECONDLY, IF WE HAD MADE THE SURFACES INTO DEVELOPABLE SURFACES, DURING THE UNROLLING PROCESS AN EXTRA SURFACE WOULD'VE BEEN ADDED TO EACH HORIZONTAL STRIP, COMPENSATING FOR THE DOUBLY CURVED SHAPES.

ONE OF THE ONLY SOLUTIONS TO THIS PROBLEM WOULD HAVE BEEN TO ANALYZE WHERE THE SURFACE HAD A HIGH DEGREE OF CURVATURE AND SHATTER EACH STRIP AT THOSE PARTICULAR POINTS.

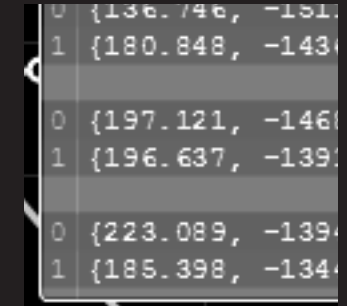
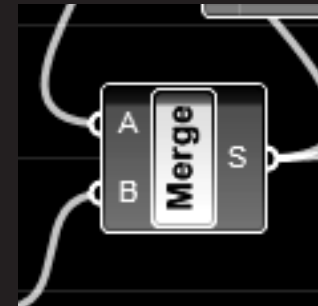
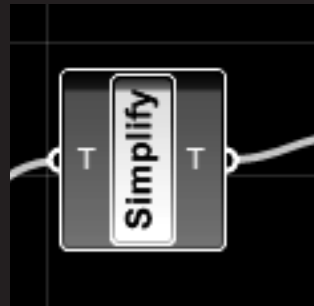
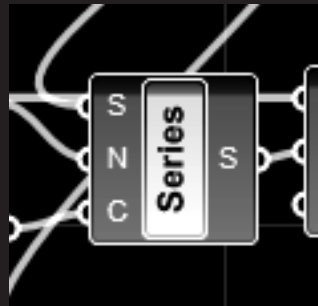
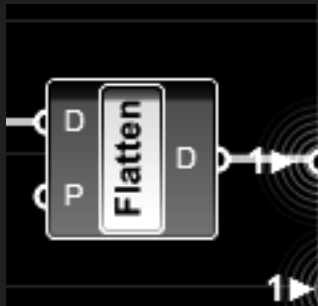
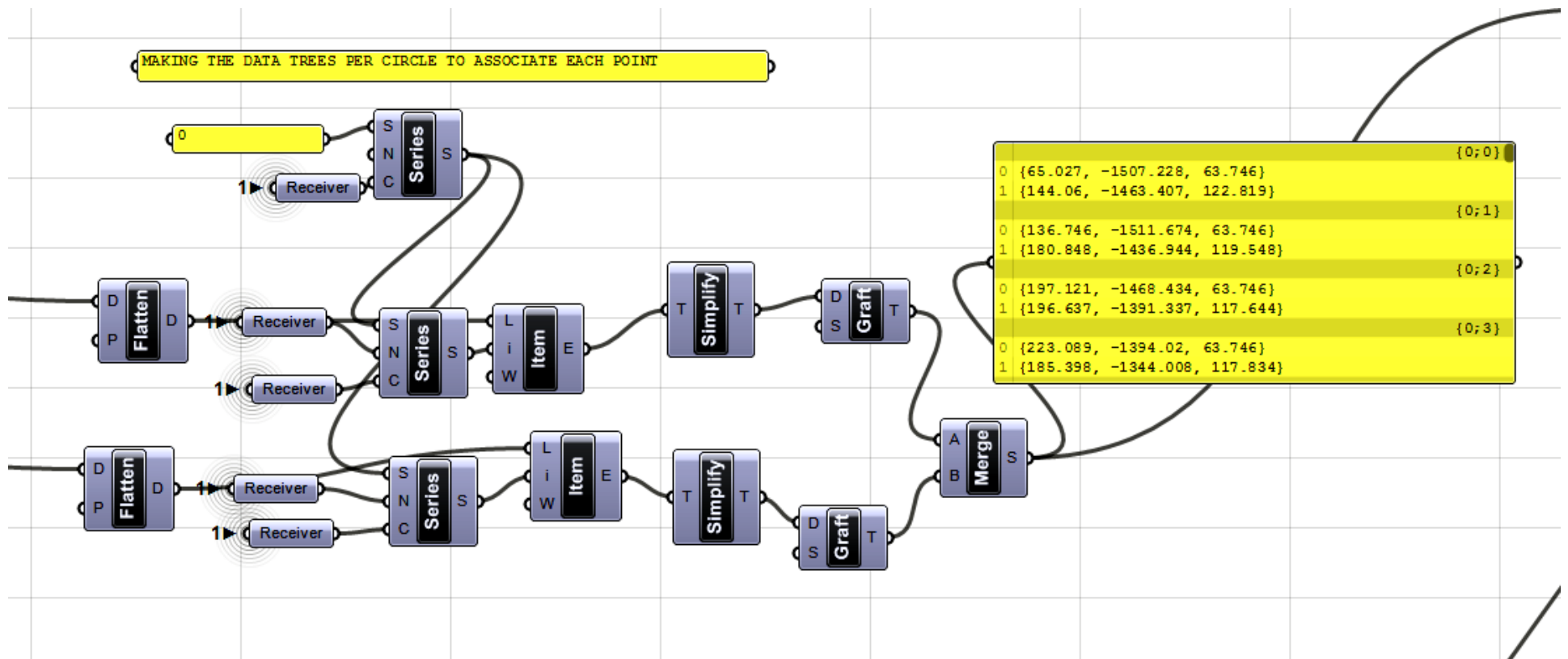
TEST MODEL



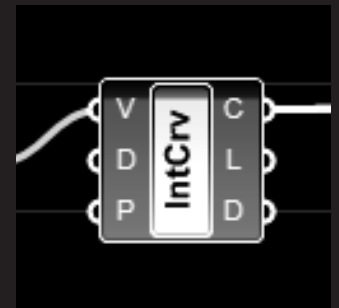
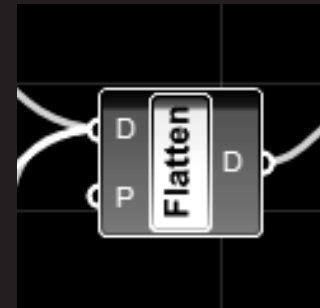
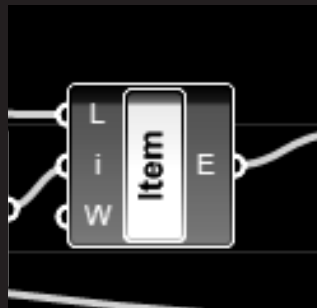
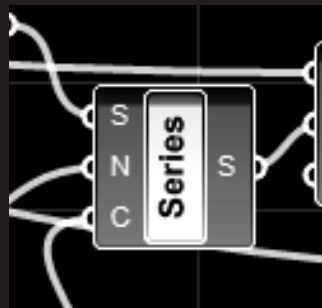
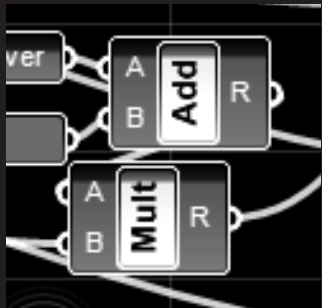
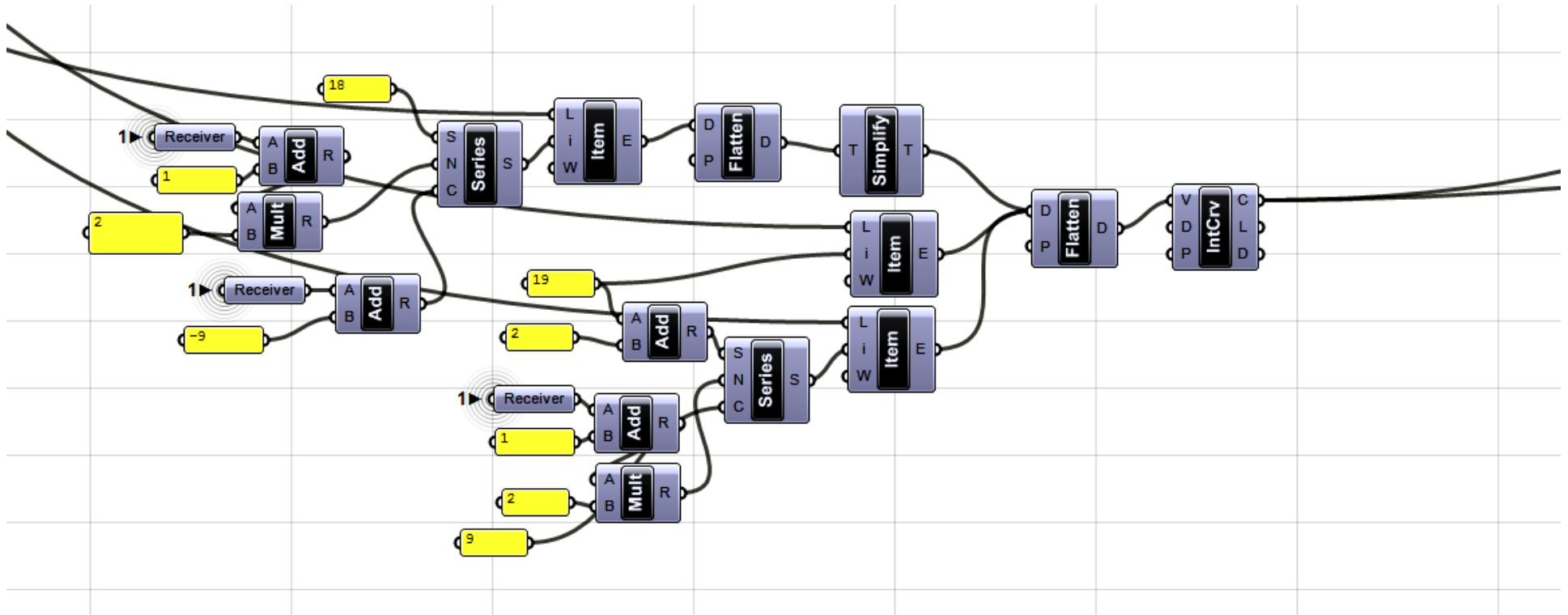
SUB SURFACES



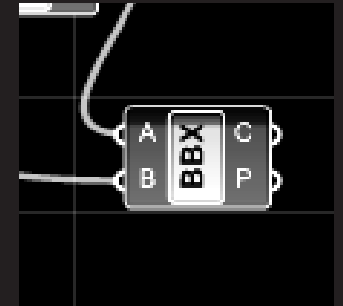
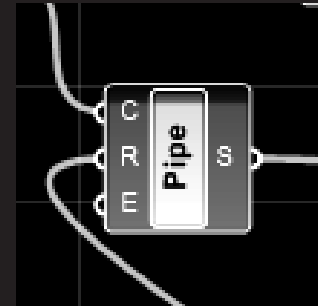
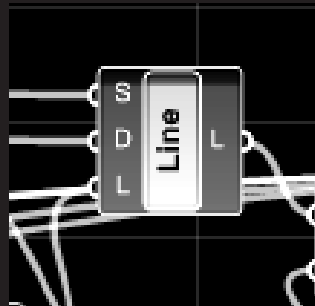
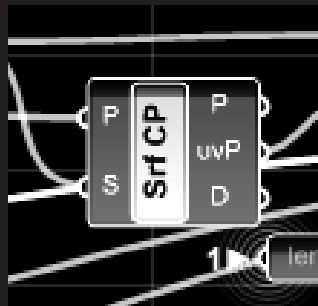
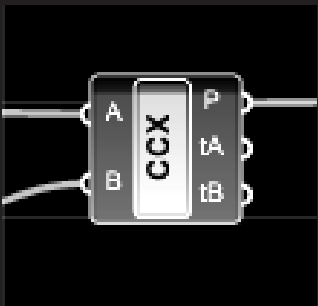
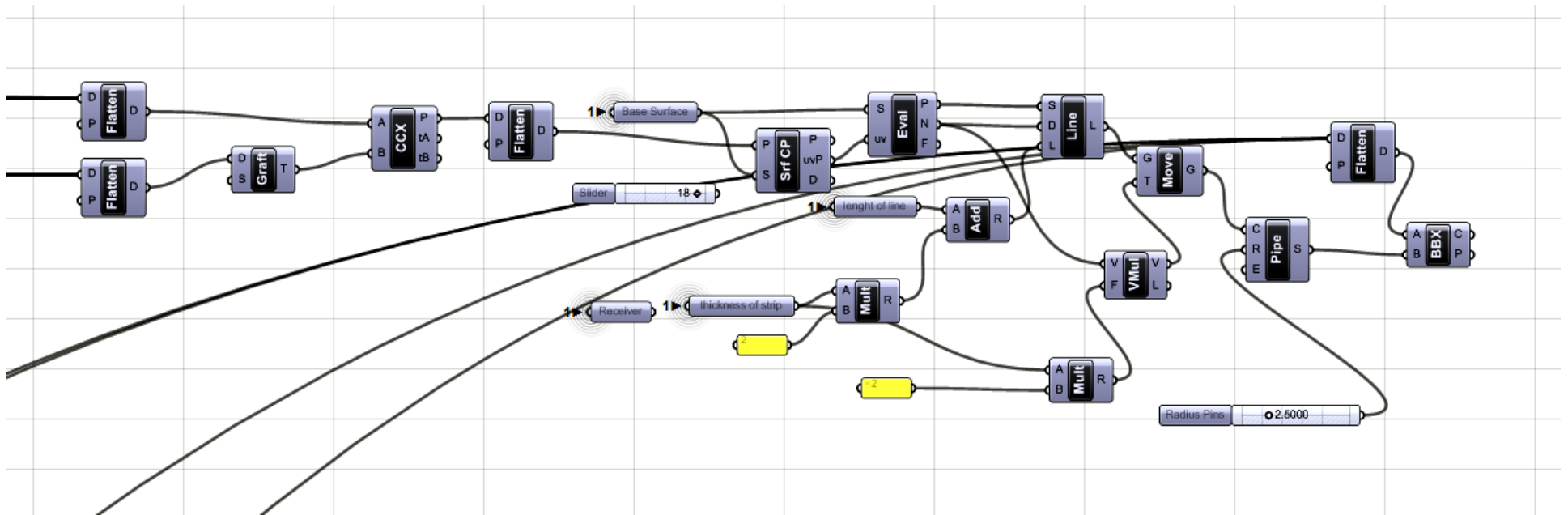
POINTS



INTERPOLATED CURVES



H O L E S



PREPARATION

PREPARATION

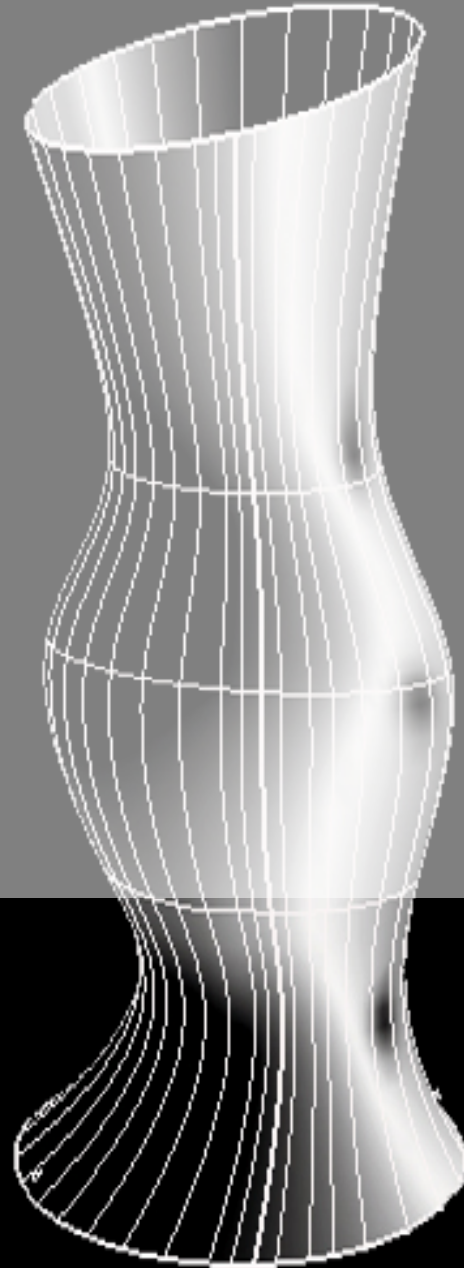
ALTHOUGH, THE STRIPS WEREN'T LOFTED AS DEVELOPABLE SURFACES, WE STILL MANAGED TO UNROLL EVERY SINGLE STRIP. WE HAD DECIDED NOT TO SPLICE THE STRIPS AND HAVE THEM BE CONTINUOUS IN ORDER NOT TO WEAKEN THE MEMBERS AND SO THAT DURING THE FABRICATION PROCESS WE COULD ACHIEVE THE SHAPE MORE EASILY. HOWEVER, THIS LED TO HAVING LONG S-SHAPED STRIPS WHICH MEANT THAT SOME PARTS OF STRIPS WERE GOING AGAINST THE GRAIN OF THE VENEER SHEETS.

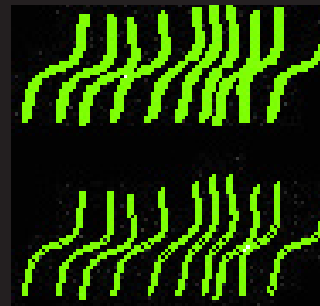
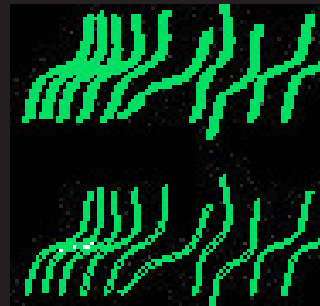
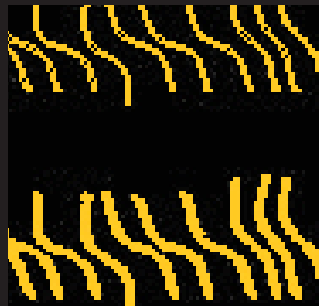
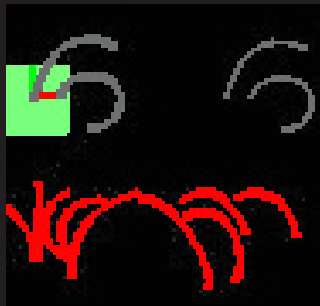
IF WE WOULD HAVE SPLICED THE STRIPS, THE FABRICATION PROCESS WOULD HAVE BEEN MUCH HARDER DUE TO THE NATURE OF THE DOUBLE-CURVED SHAPE.

IN THE TEST PIECE, WE HAD CUT THE STRIPS PLACING THEM ON THE VENEER SHEETS IN VARIOUS DIRECTIONS, NEGLECTING THE IMPORTANCE OF THE DIRECTION OF THE GRAIN WHICH ADDED A LOT OF STRENGTH TO EACH STRIP. FOR THE FINAL STRIPS, WE TOOK SPECIAL ATTENTION TO TAKE ADVANTAGE OF THIS AS MUCH AS POSSIBLE. HOWEVER AS MENTIONED ABOVE, SINCE THE PIECES WERE NOT SHATTERED AND WENT IN VARIOUS DIRECTIONS SOME PARTS OF SOME CIRCULARLY SHAPED UNROLLED STRIPS WERE STILL QUITE WEAK RUNNING ALONG THE GRAIN OF THE VENEER WHICH RESULTED IN THE WARPING OF SOME STRIPS DURING THE FABRICATION PROCESS.

ANOTHER IMPORTANT PART OF THE PREPARATION PROCESS WAS THE ACTUAL LASERCUTTING OF THE STRIPS. IN THE INITIAL TEST PIECE WE HAD SANDWICHED THE VENEER IN BETWEEN A SACRIFICIAL PIECE OF

SCALE ISSUE





MDF AND A PIECE OF CARDBOARD IN ORDER TO AVOID THE WAR -
ING OF THE SHEET. THE PROCESS ENDED UP TRAPPING THE SMOKE
IN BETWEEN THE TWO LAYERS, NOT ALLOWING IT TO BE EVACUATED
BY NEITHER THE TOP OR BOTTOM VENTS. THEREFORE, FOR THE FINAL
LASERCUTTING PROCESS, THE VENEER WAS FIXED ON TOP OF A SA -
RIFICIAL PIECE OF MDF USING DOUBLE SIDED TAPE LETTING THE TOP
VENTS EVACUATE THE ACCUMULATED SMOKE FROM THE VENEER.

WE ALSO DISCOVERED THAT THE ORDER IN WHICH THE LASERCUTTER
CUTS EACH LINE DEPENDS ON THE COLORS ASSIGNED TO EACH LINE.
BY SETTING THE COLORS SO THAT THE HOLES, THE HORIZONTAL LINES
AND FINALLY THE VERTICAL LINES WERE CUT IN THE SAME ORDER.
THIS METHOD SAVED US A LOT OF TIME, SINCE WE DID NOT HAVE TO
STOP THE LASERCUTTER EACH TIME TO TAPE DOWN THE FLYING PIECES.



CONSTRUCTION

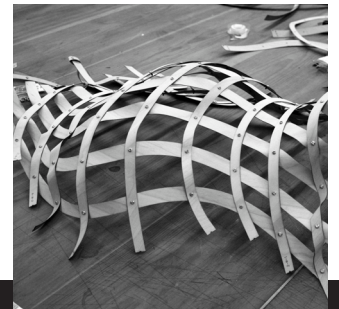
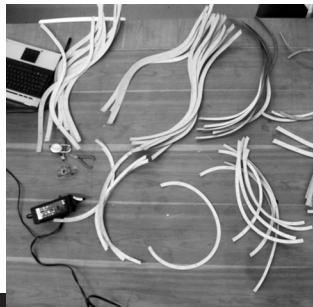
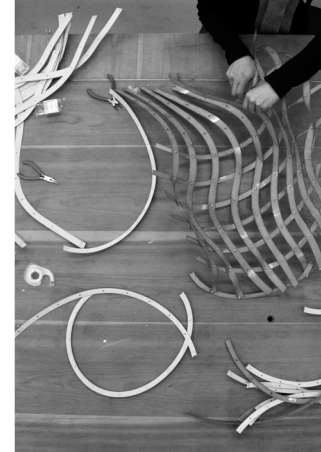
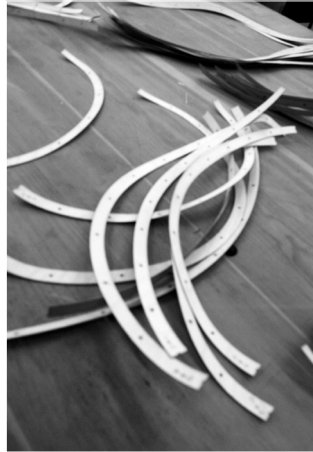
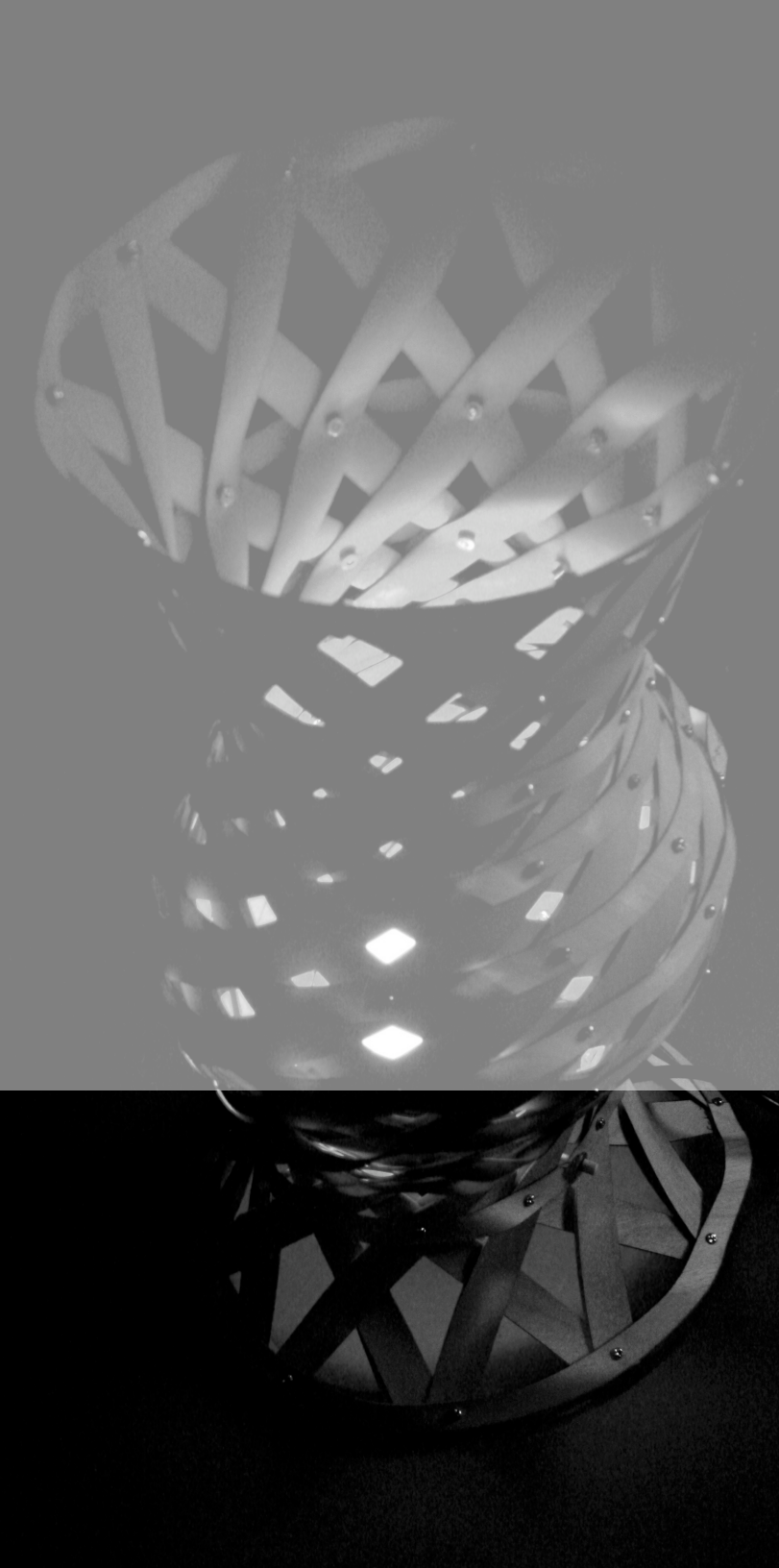
FABRICATION

WE STARTED OUT BY CONSTRUCTING THE LAMP ON A FLAT PLANE. WE LAYERED EACH STRIP FLAT ON TOP OF EACH OTHER WITH THE OUTER RING LAYER FIRST AND THEN THE TWO DIAGONALS. WHEN THE FIRST SET OF LAYERS WERE MORE OR LESS LAID OUT, WE THEN TRIED TO CLOSE THE SHAPE. HOWEVER, WE NOTICED THAT THIS METHOD WAS NOT THE BEST WAY OF PROCEEDING. FIRSTLY, WE HAD A HARD TIME TWISTING THE SHAPE INTO ITS RIGHT FORM AND SECONDLY, WE WERE ONLY ABLE TO TRULY DEPICT AND RESOLVE THE MISTAKES THAT WE HAD MADE AFTER CLOSING THE SHAPE.

ON OUR SECOND TRY, WE DECIDED TO CLOSE ALL THE OUTER RINGS AND STARTED BUILDING THE FORM IN ITS ACTUAL SHAPE. WHEN ALL THE OUTER RINGS WERE CLOSED OFF, WE PASSED ONE OF THE DIAGONALS THROUGH ALL OF THEM AND SECURED THE CONNECTIONS WITH SCREWS. FROM THERE, THE OTHER DIAGONALS OF THE SAME DIRECTION WERE THEN SECURED TO THE RING CONSECUTIVELY. THIS WAY, IT WAS EASIER TO FIND WHICH HOLES COINCIDED IN RELATION TO THE FIRST DIAGONAL THAT WAS ALREADY SECURED TO THE OUTER RING. IN ADDITION, SINCE THE SHAPE IS ALREADY IN 3-D, IT WAS EASIER TO COMPARE IT WITH THE DIGITAL MODEL WHEN IN DOUBT OF ANY ERRORS. AFTER THE FIRST SET OF LAYERS WAS DONE, THE SECOND SET WAS A MATTER OF FOLLOWING THE FIRST SET.

BECAUSE WE WANTED THE SCREW HEADS TO BE ON THE OUTSIDE, WE WORKED FROM THE OUTSIDE IN TO AVOID HAVING TO REMOVE THE SCREWS AT EACH LAYER. THE SHAPE HAD A BIG ENOUGH OPENING AND SPACE TO WORK FROM THE OUTSIDE IN.





FIRST CONSTRUCTION STRATEGY: FLAT

ALTHOUGH, WE DID UNDERSTAND BEFORE DOING SO THAT THIS WOULD CAUSE DIFFICULTY IN THE ASSEMBLING PHASE OF THE SECOND SET OF LAYERS, THE INNER LAYERS.

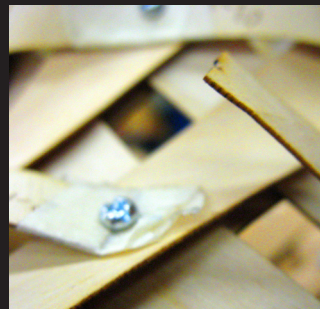
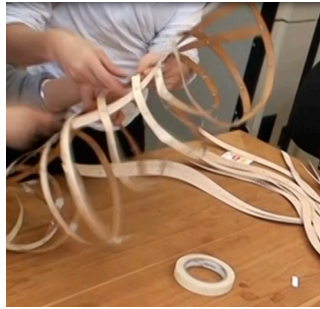
ISSUES ENCOUNTERED:

APART FROM THE GENERAL FABRICATION METHOD, THERE WERE SOME OTHER ISSUES THAT WE ENCOUNTERED DURING THIS PROCESS. THE MAIN ONE WAS THE RING STRIPS WHICH ONCE UNROLLED WERE STILL IN THEIR SOMEWHAT CIRCULAR SILOUHETTER. AS MENTIONED IN THE PREPARATION PROCESS, THE DIRECTION OF THE WOOD VENEER FIBERS ON EACH STRIP HAD GREAT REPERCUSSION ON THEIR STRENGTH AND HENCE ON THE CONSTRUCTION OF LAMP. THE STRIPS WITH THE DIRECTION OF THE FIBERS RUNNING ALONG MORE OR LESS LONGITUDINALLY ALONG THE STRIP WERE MUCH MORE RIGID THAN THE ONES RUNNING TRANSVERSALLY OF IT.

MOREOVER, THE HOLES WERE CUT SLIGHTLY DISTORTED AND THIS CAUSED THEM TO BE SMALLER THAN THEY WERE SUPPOSED TO BE. BEFORE AND DURING THE ASSEMBLING, WE HAD TO INDIVIDUALLY ENLARGE EACH HOLE AND THIS ELONGATED THE PROCESS.

AND FINALLY AS PREVIOUSLY MENTIONED THE HORIZONTAL RING STRIPS WERE NOT LOFTED AS DEVELOPABLE SURFACES RESULTING IN THEM BEING SLIGHTLY LONGER THAN NEEDED AND HENCE WARPED WHEN PUT IN PLACE. BECAUSE OF THIS, WE WERE UNABLE TO PUT THE INSIDE HORIZONTAL LAYERS BECAUSE THE WARPING WAS MUCH MORE SIGNIFICANT.







BUDGET

BUDGET

HERE IS AN OVERALL BREAKDOWN OF OUR BUDGET FOR THIS LAMP:

VENEER: $12\$ \times 7 = 84\$$

BOLTS: 20\$

LAMP BASE: 3\$

WIRE: 7\$

LIGHT BULB: 3\$

TOTAL :117\$

MORE SHEETS OF VENEER WERE NEEDED DUE TO THE FACT THAT WE DID NOT WANT TO SHATTER THE STRIPS AND ALSO DUE TO THE CIRCULAR NATURE OF THE SHAPE AND THE RESULTANT UNROLLED STRIPS. ALSO WE WANTED TO ACHIEVE A CERTAIN PROPORTIONALITY WITH THE OVERALL HEIGHT OF THE LAMP AND THE THICKNESS OF THE STRIPS. WE WERE OVERALL ABOUT 40 DOLLARS OVER THE INITIAL BUDGET. HOWEVER HAD THE BUDGET BEEN SET BEFORE WE HAD SETTLED ON A FINAL SHAPE WE WOULD HAVE MODIFIED IT IN ORDER TO ACCOMMODATE THIS LIMITATION.

