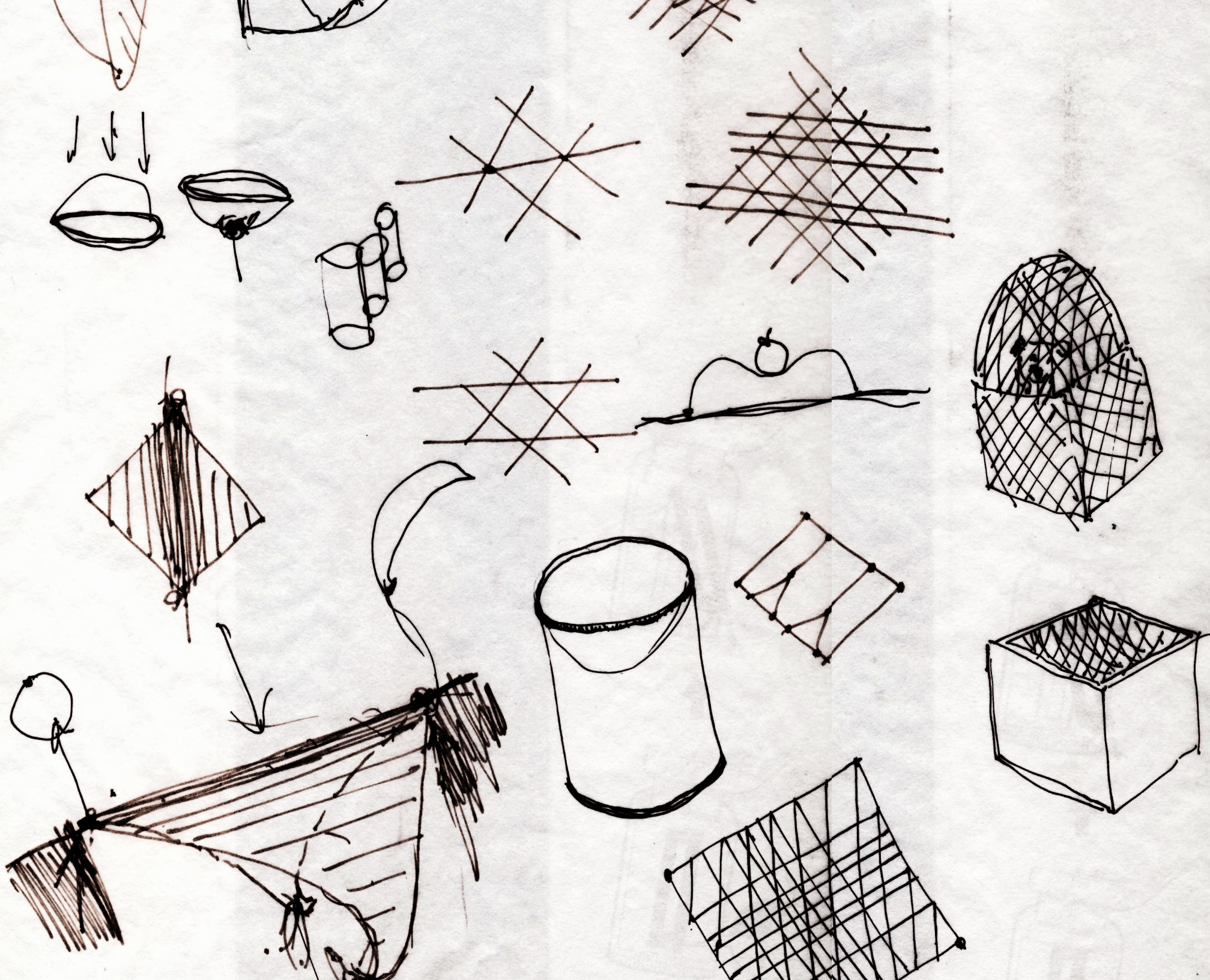




project 3

ARCH 678 – Project 3 - Dec 8 2010

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design

design decisions

The decision was made to design an irregular lattice form inspired by elements from the Metz Pompidou where **a lattice transforms from a circular bottom edge to an irregular top edge**

Based on the first group projects it was decided that;

- i) **Wider strips** provide more stiffness, and stronger joints, and;
- ii) **Less strips** simplify laser cutting time, transportation, and assembly time, and reduce material use.



METZ POMPIDOU DETAIL: showing transformation from circular base towards irregular top

joint test a



JOINT TEST A: 3mm hole joints located 4mm apart with plastic zip tie connections.

lessons learned

- i) **Zip ties produced uneven pressure** between the two holes making it prone to failure in these already weak areas.
- ii) The larger the diameter of the bottom circular edge, the less tension is induced on the wood veneer ring. Too much tension and it will fail.

joint test b



JOINT TEST B: double 3mm hole joints located 6mm apart with steel bolted connections

lessons learned

- i) Bottom circular edge failed due to too much tension in the veneer, therefore **the circular bottom edge must be a minimum of 200mm in diameter**, preferably larger
- ii) **Bolt connections increased stiffness**; The compression of wood layers between the nuts and bolt heads provided strength in the model.

joint tests

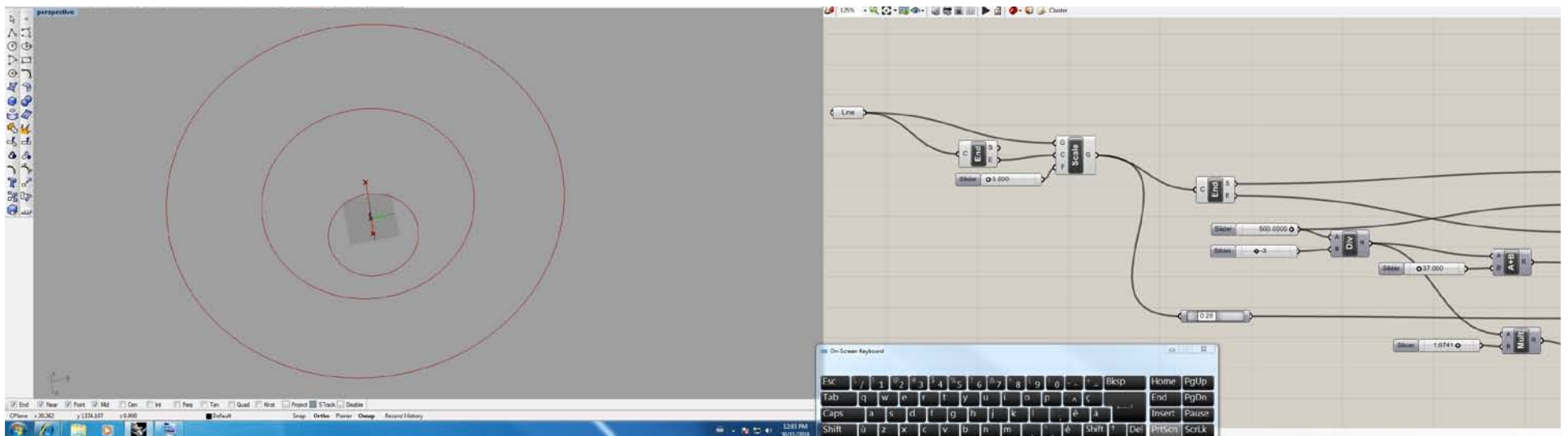
joint test conclusions

- i) **20mm wide veneer strips** provided more stiffness than expected, only two layers would be necessary for the final lattice model
- ii) **Cutting the length of strips with the veneer grain** is best, cross grain pieces are weak and should be avoided
- iii) **Single hole joints worked best**; holes 6mm apart weakened the wood veneer making it prone to failure.
- iv) **Bolt connections worked best** by compressing the pieces together adding stiffness. Zip ties required two holes close together weakening the veneer and should not be used.

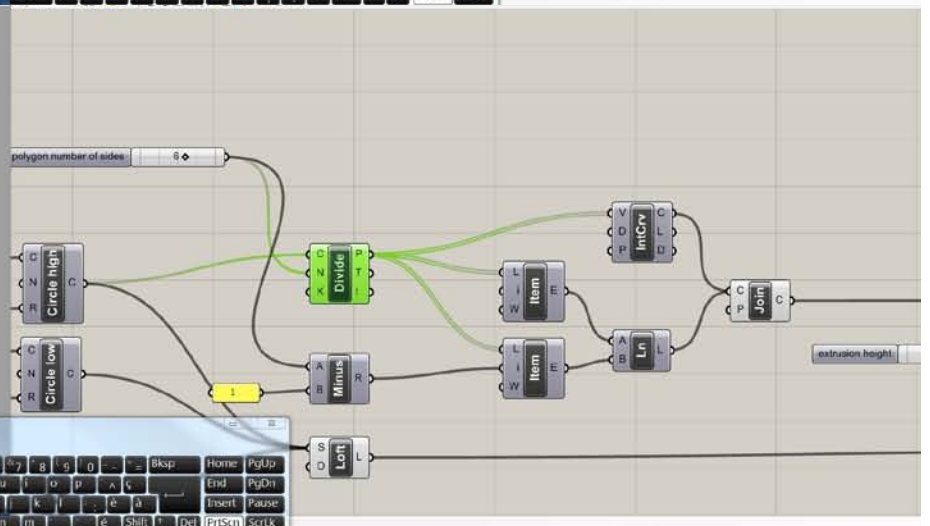
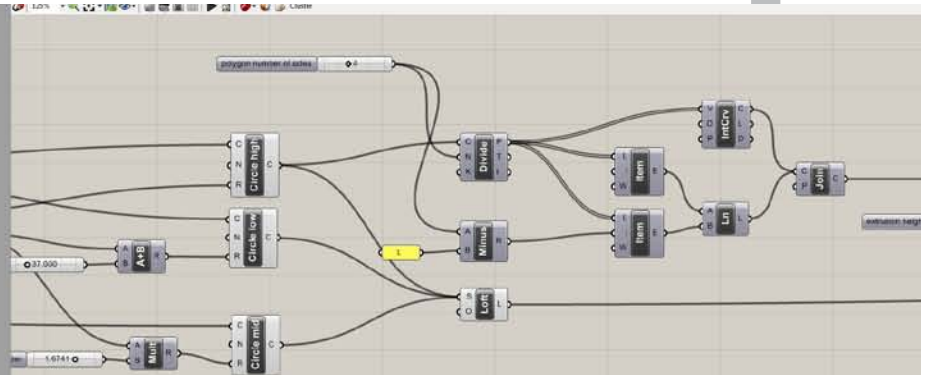
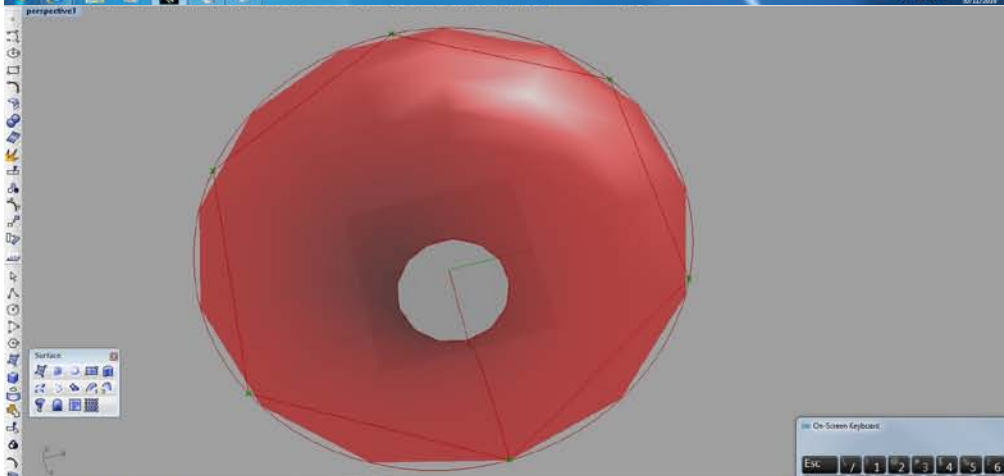
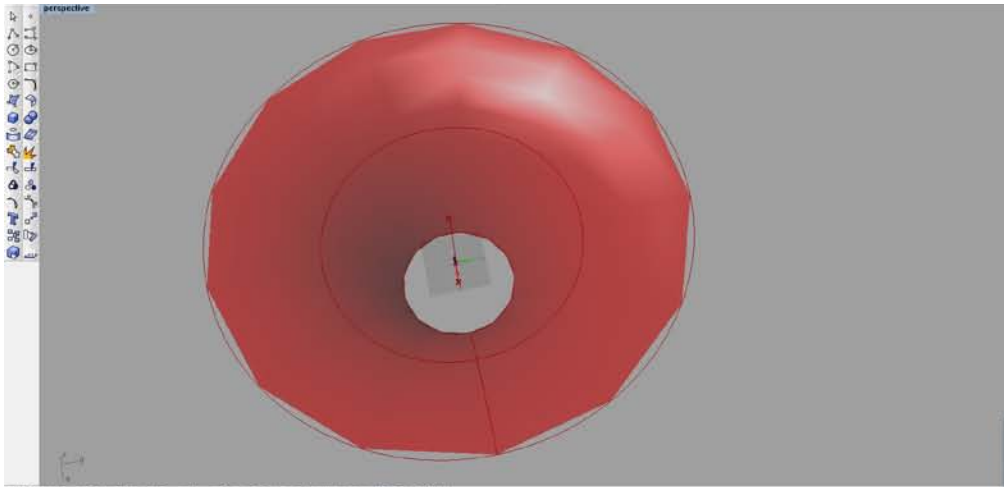


TWO JOINT TEST MODELS: steel bolt and plastic zip tie joints tests

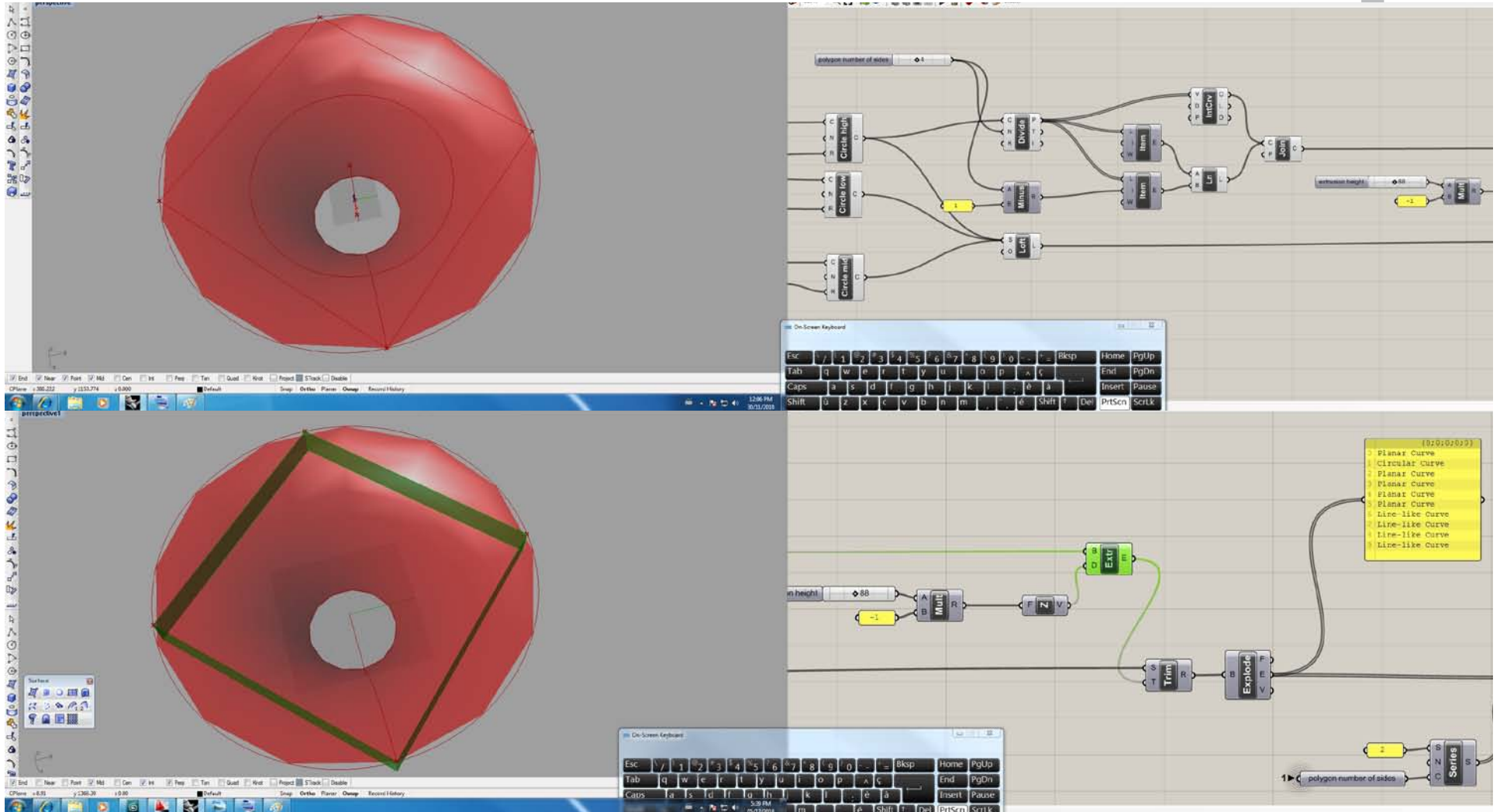
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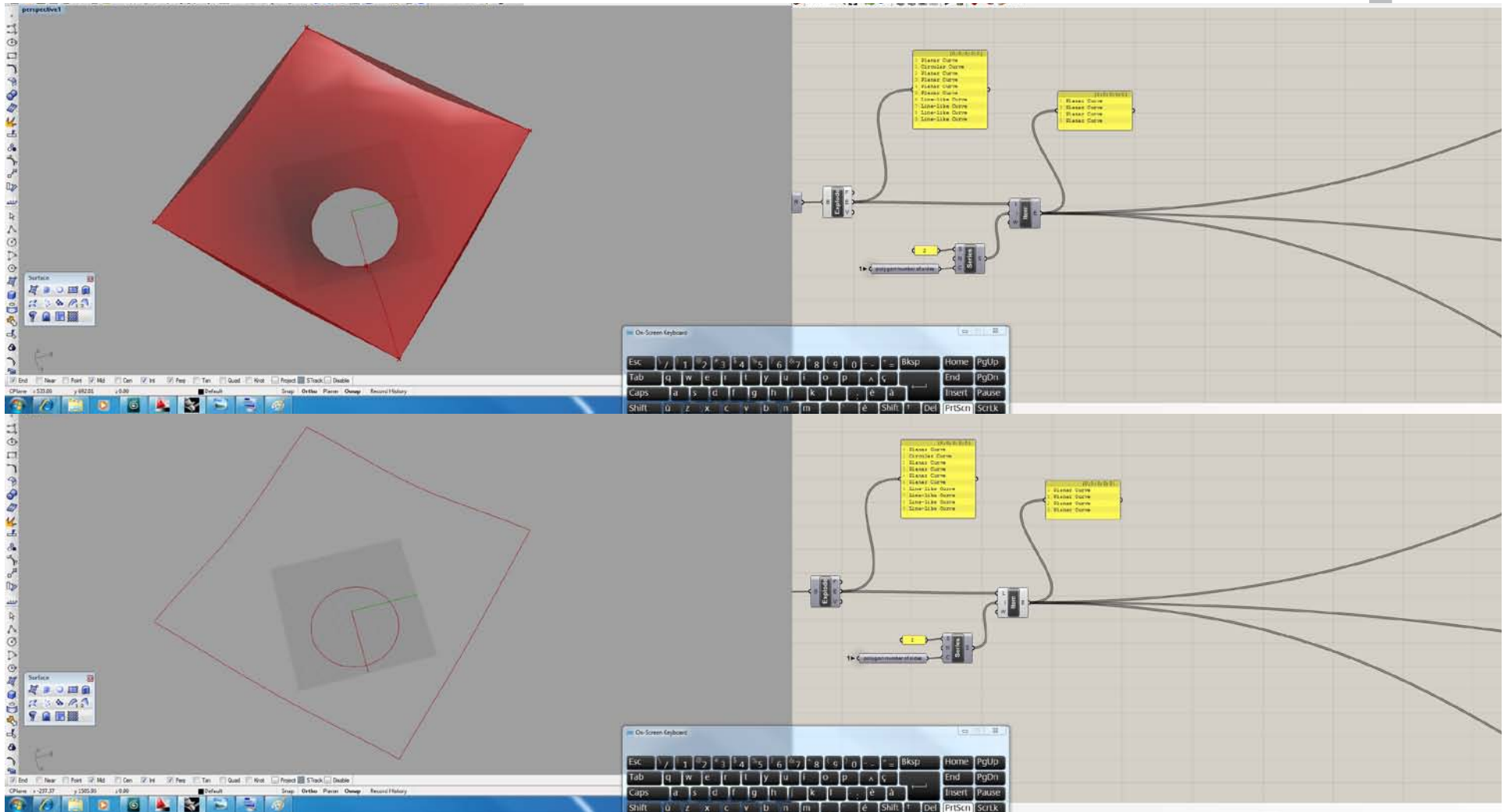
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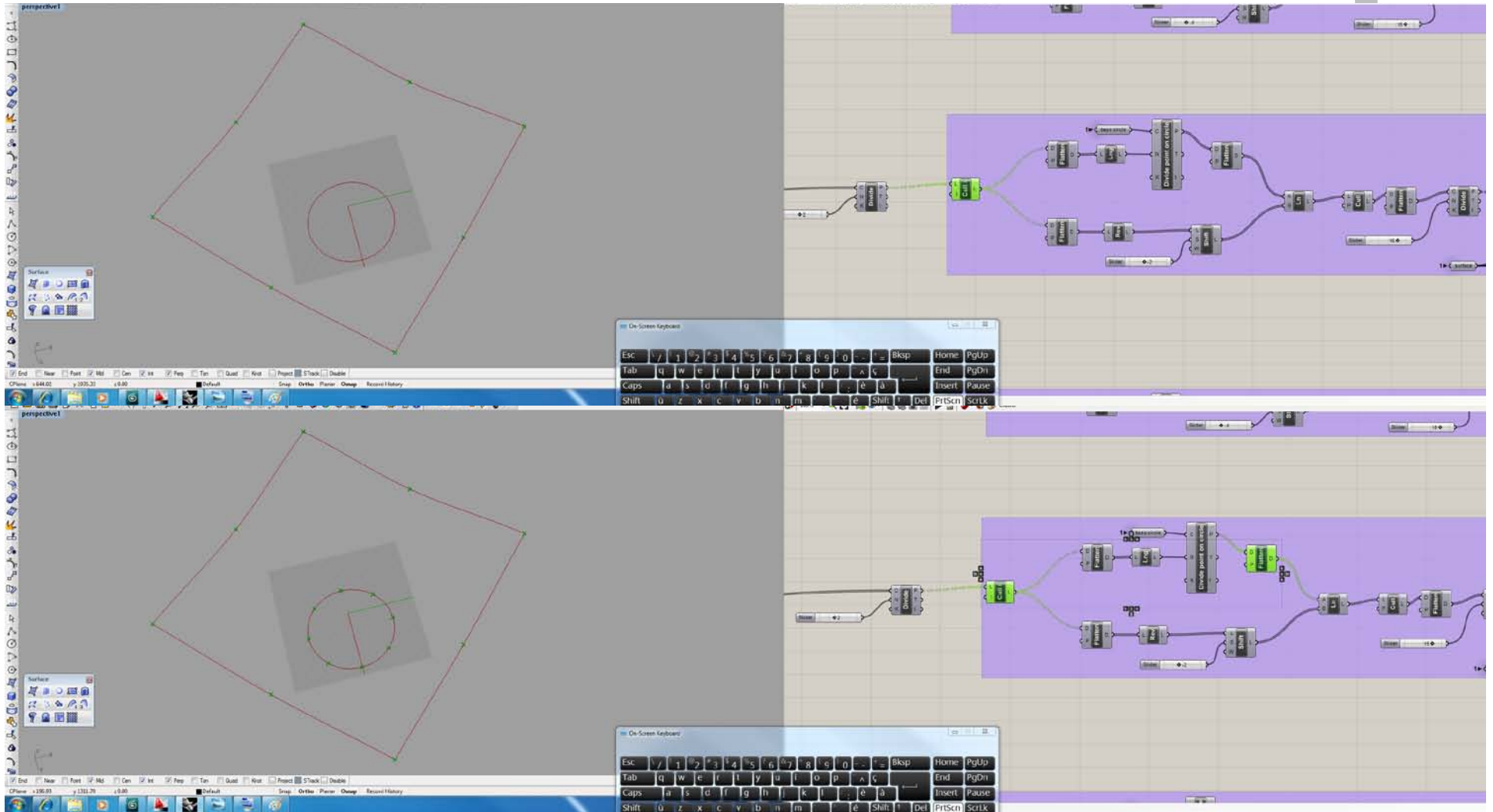
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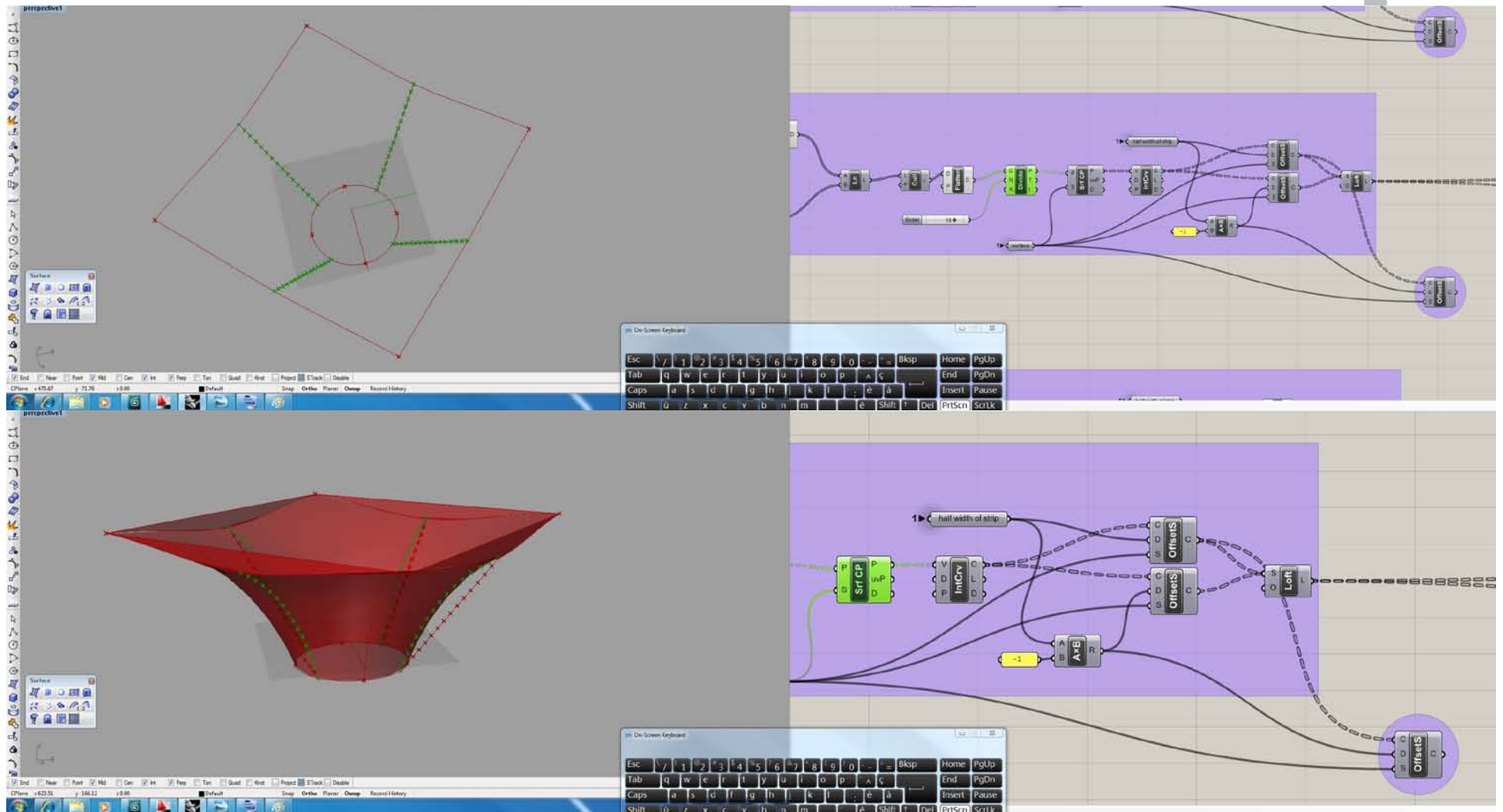
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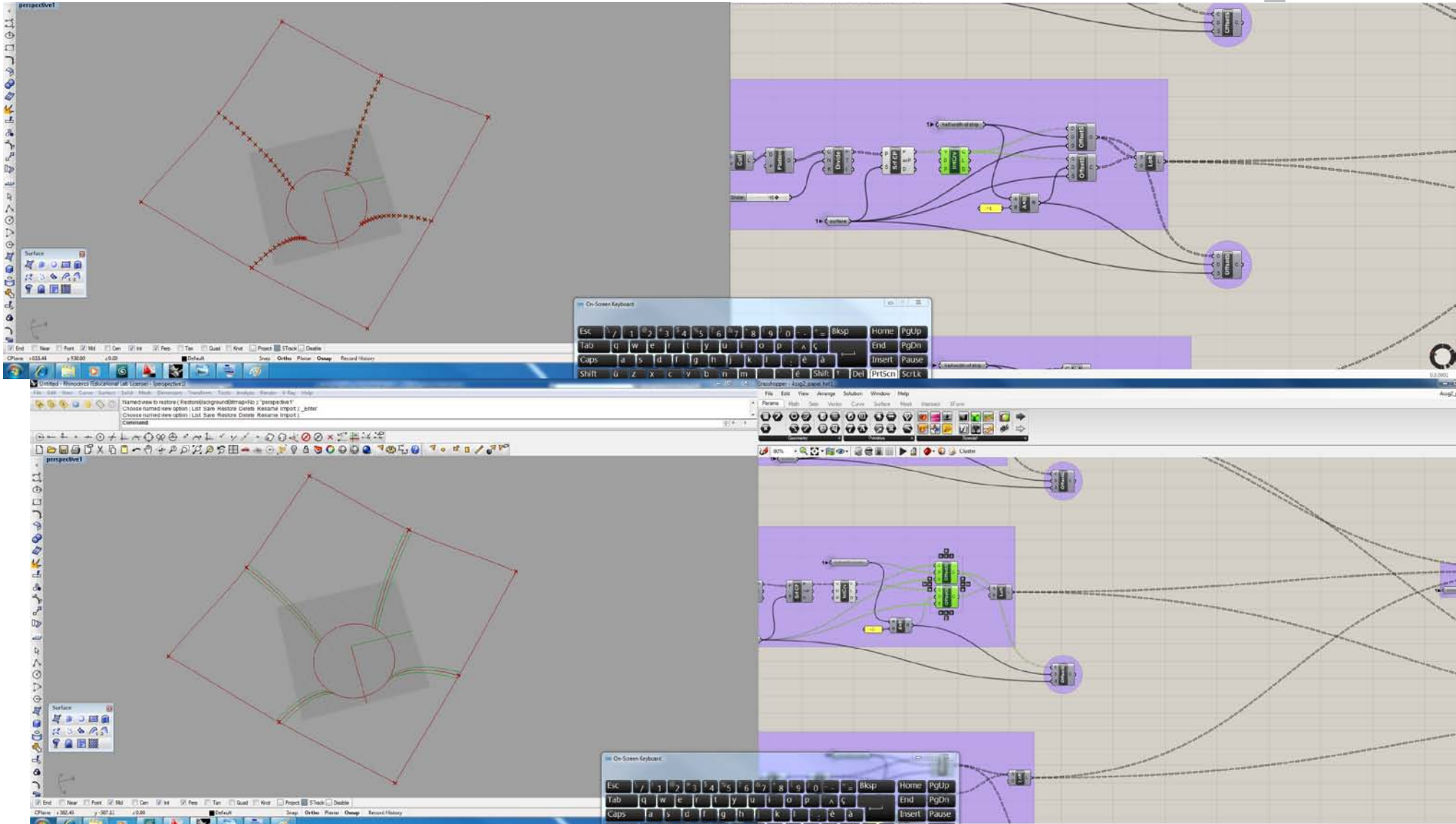
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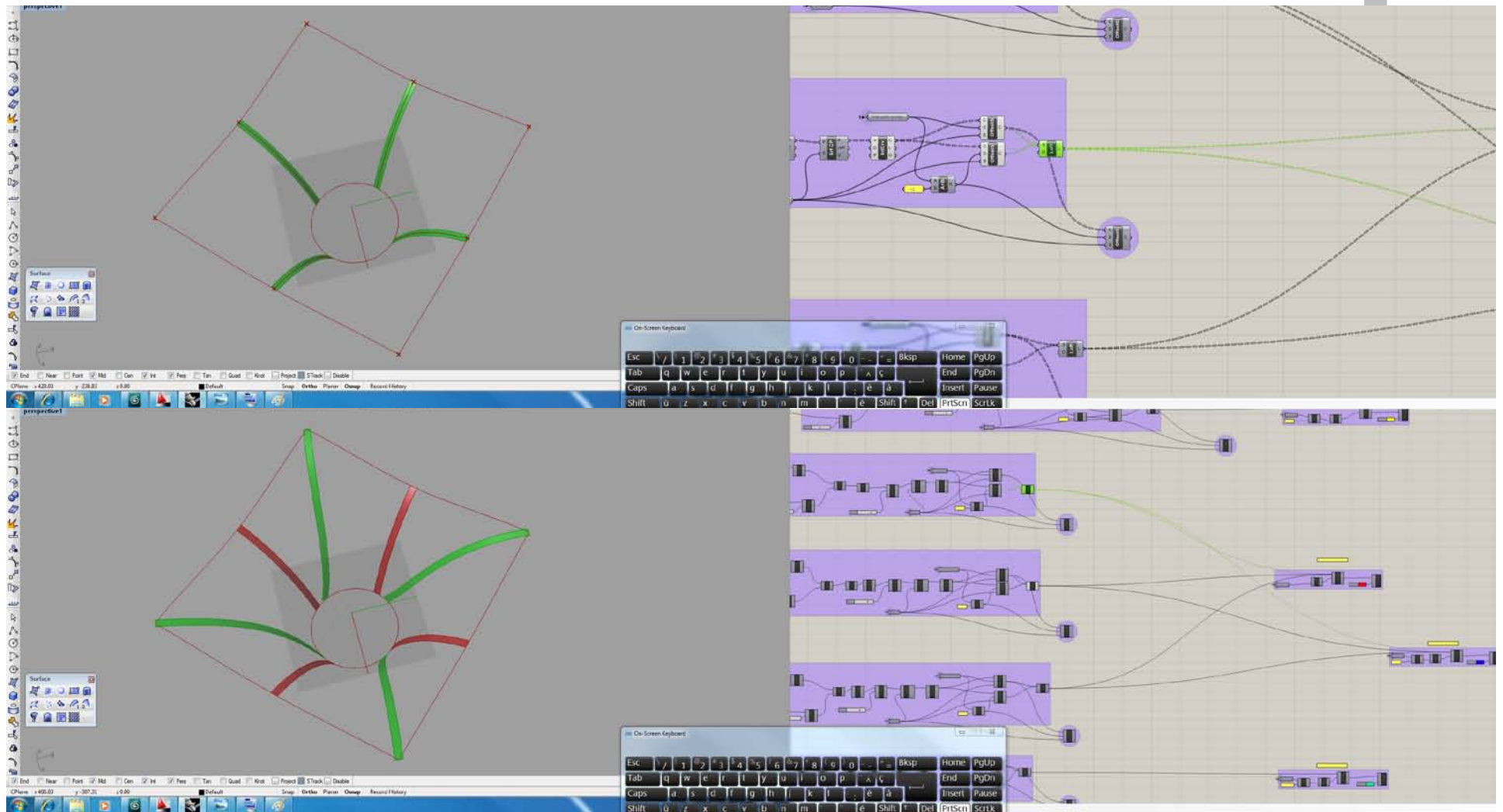
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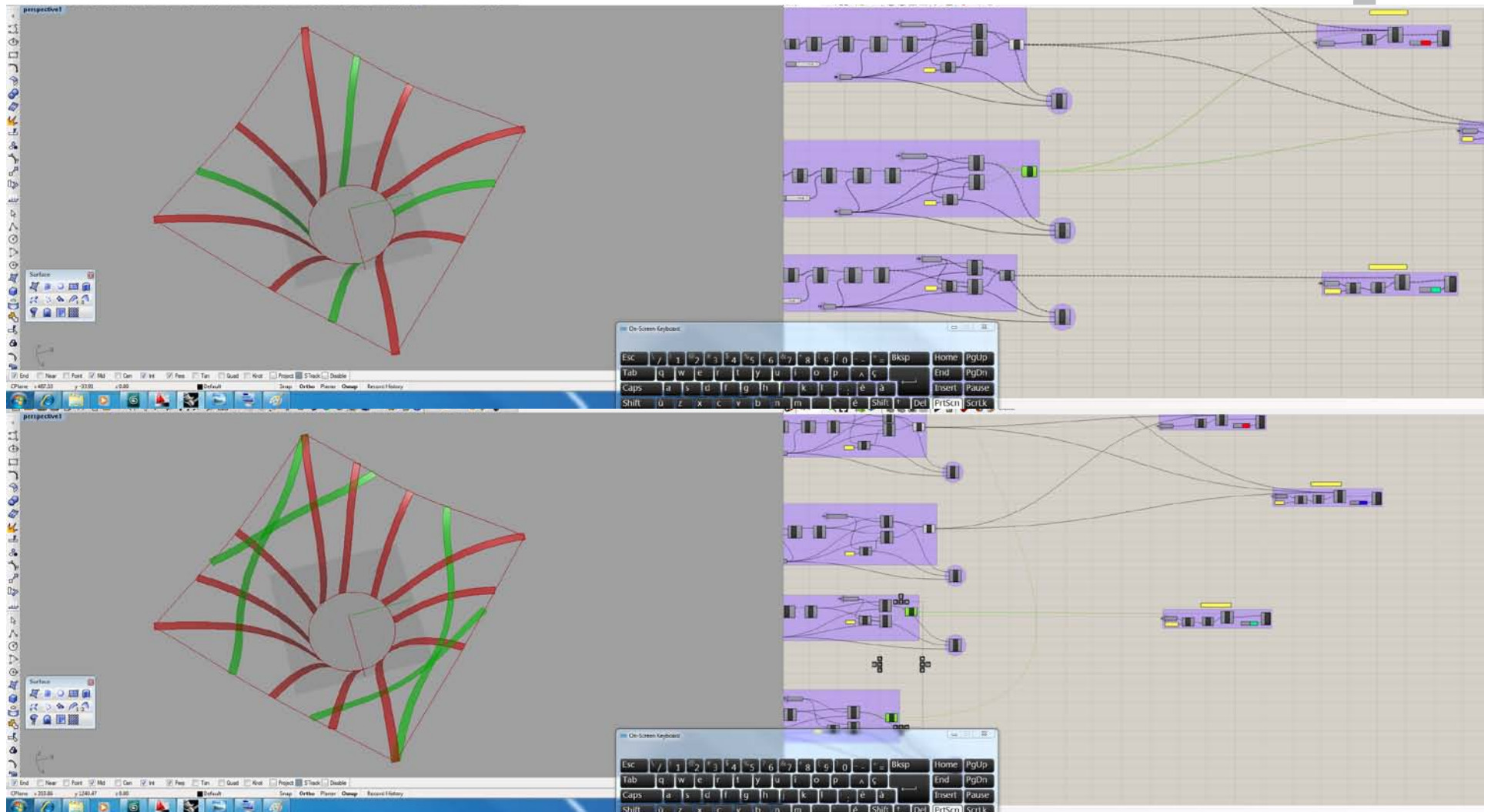
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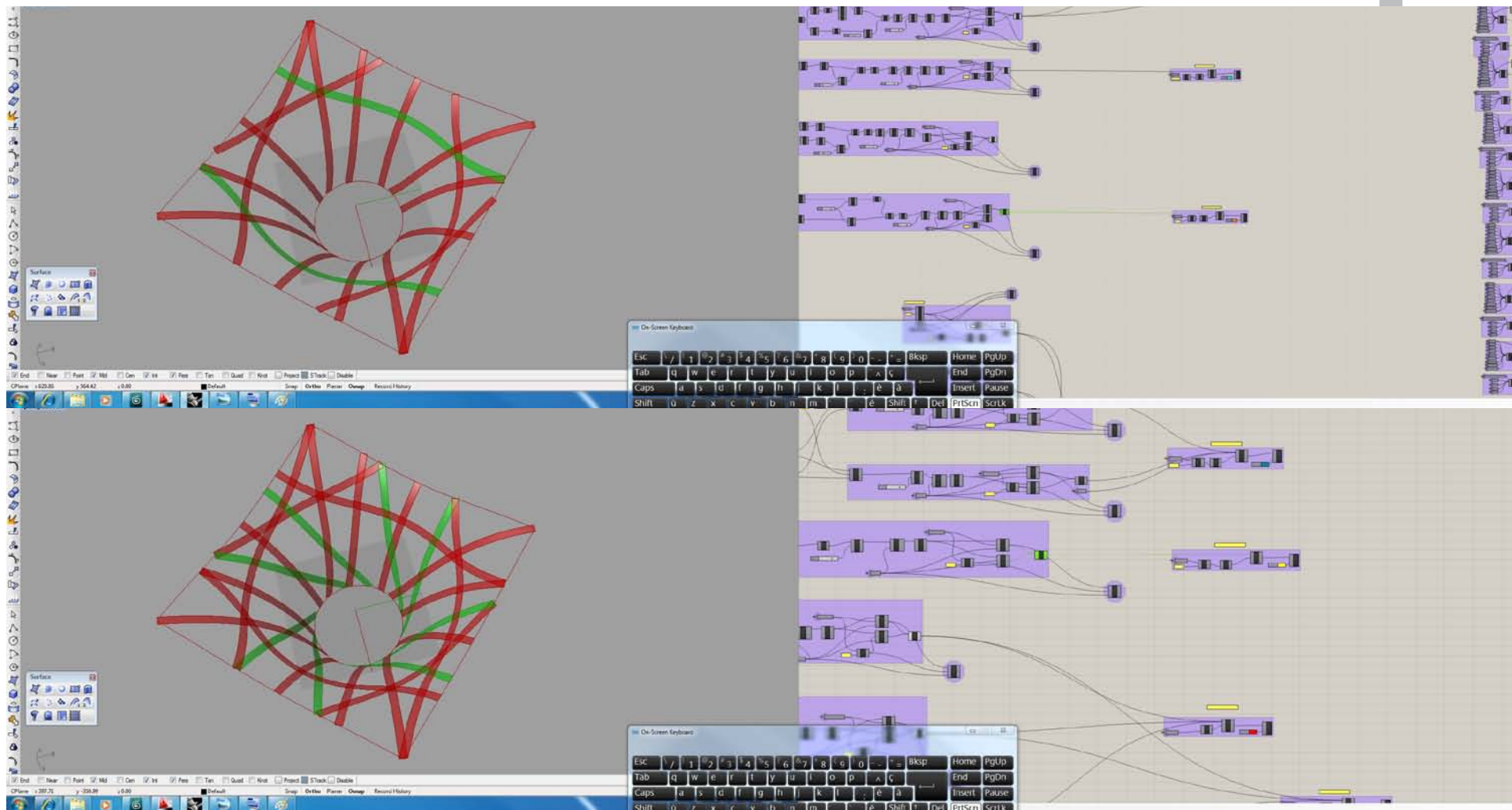
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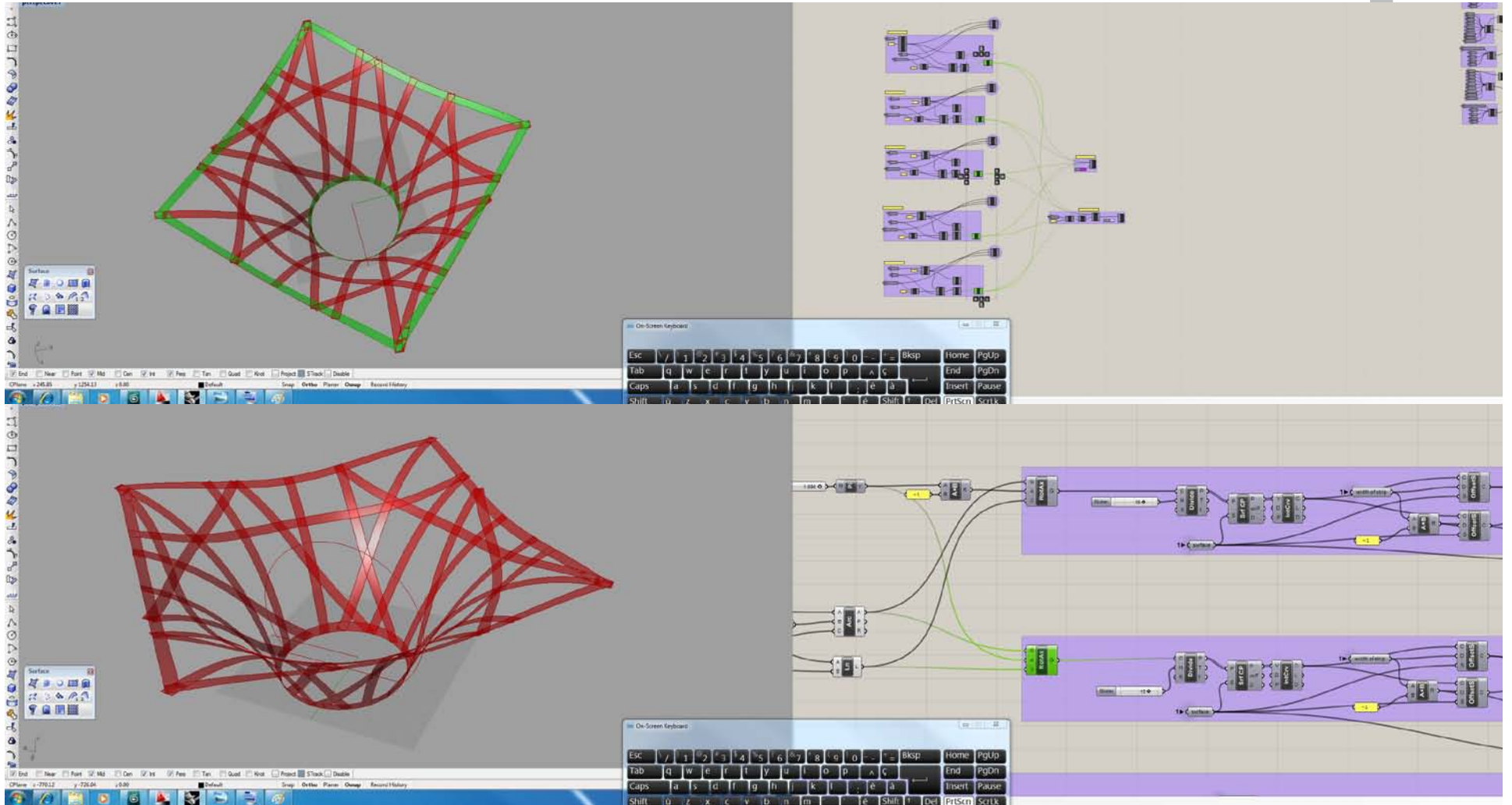
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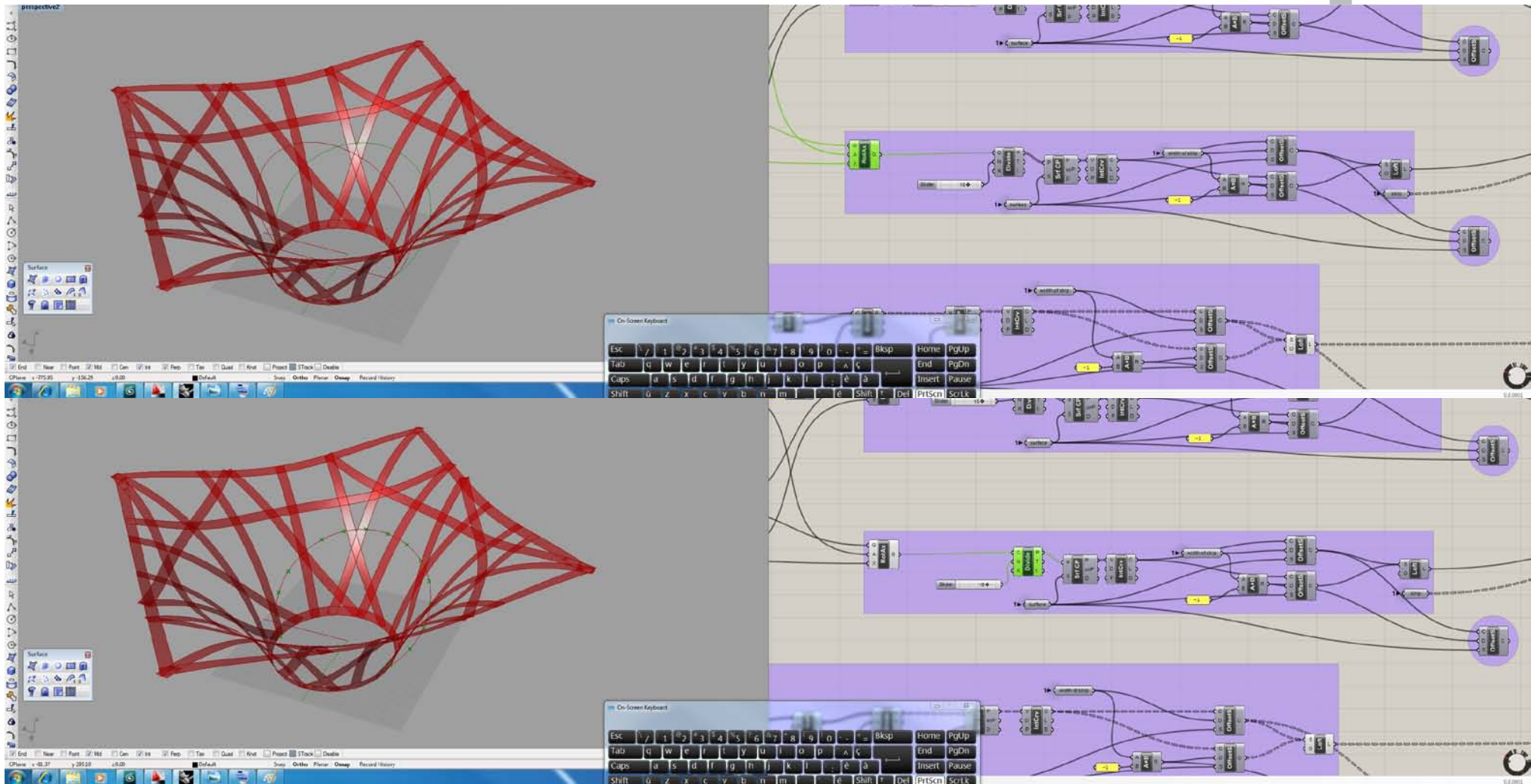
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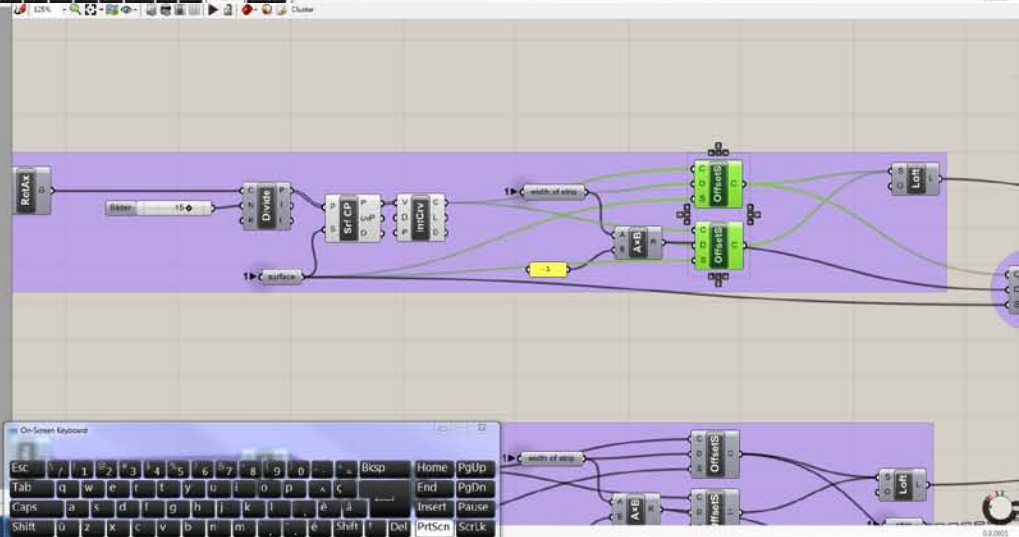
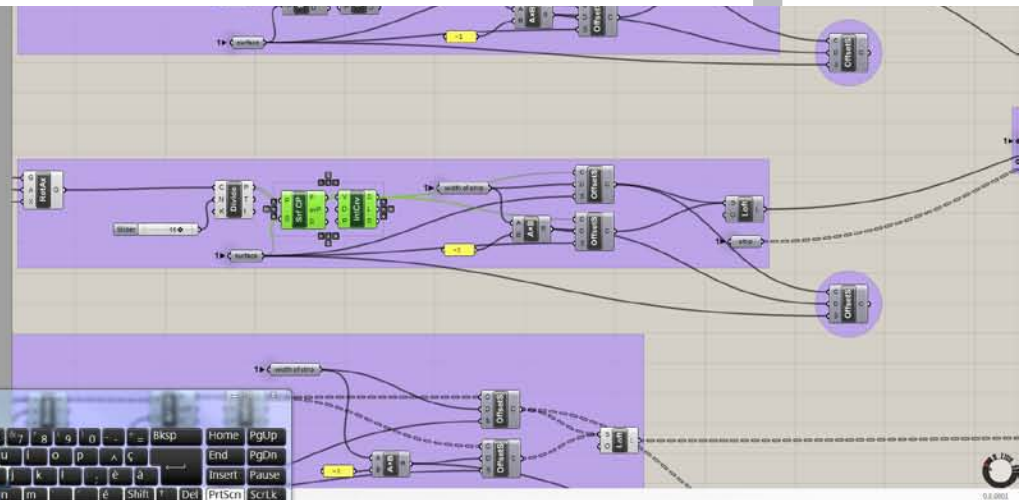
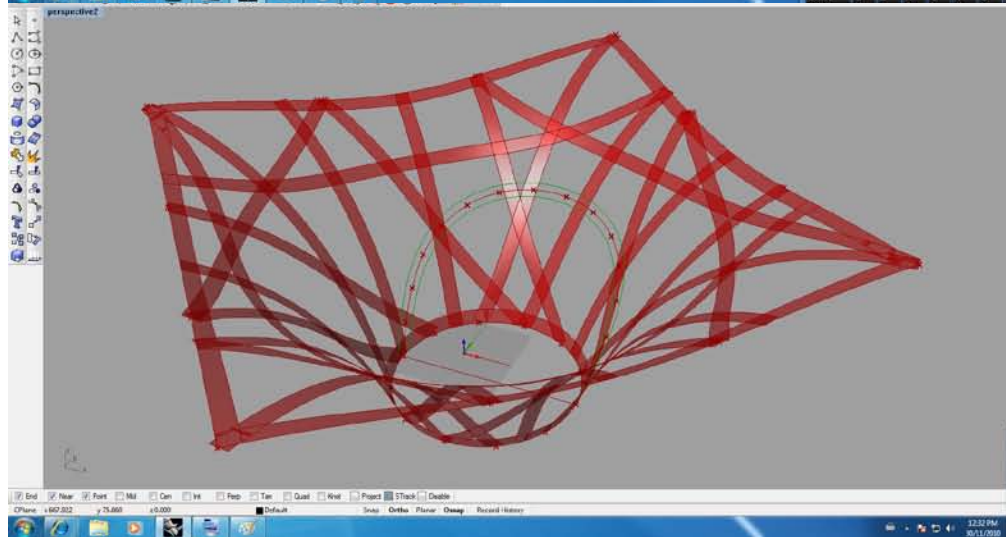
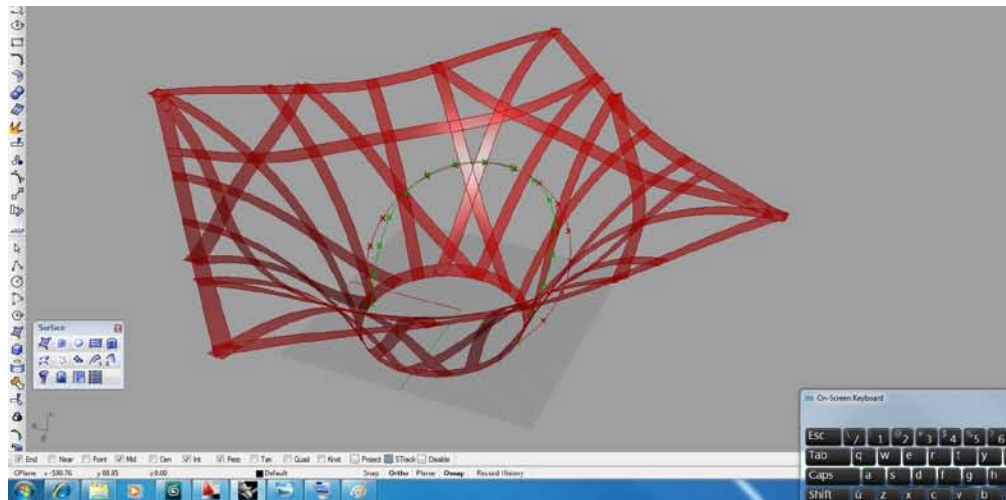
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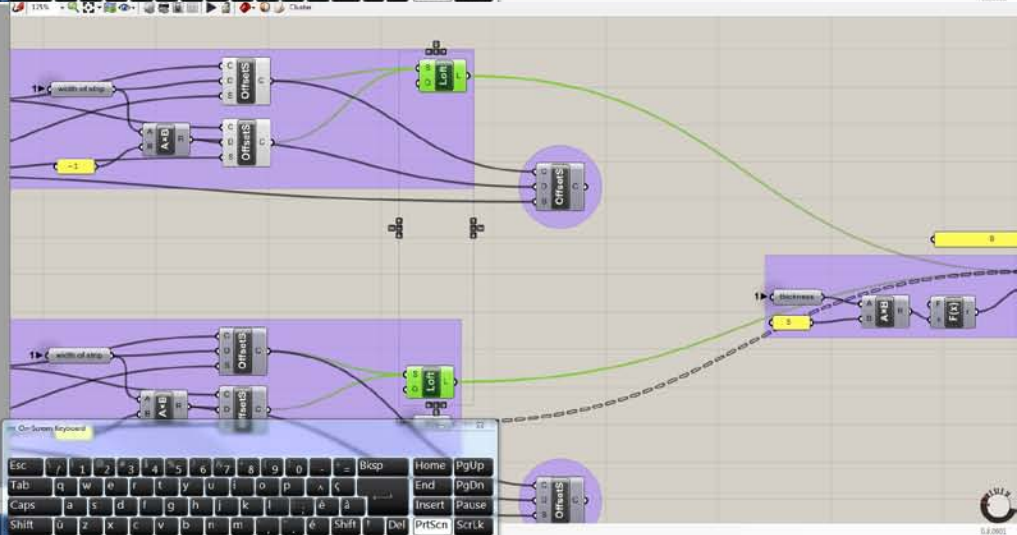
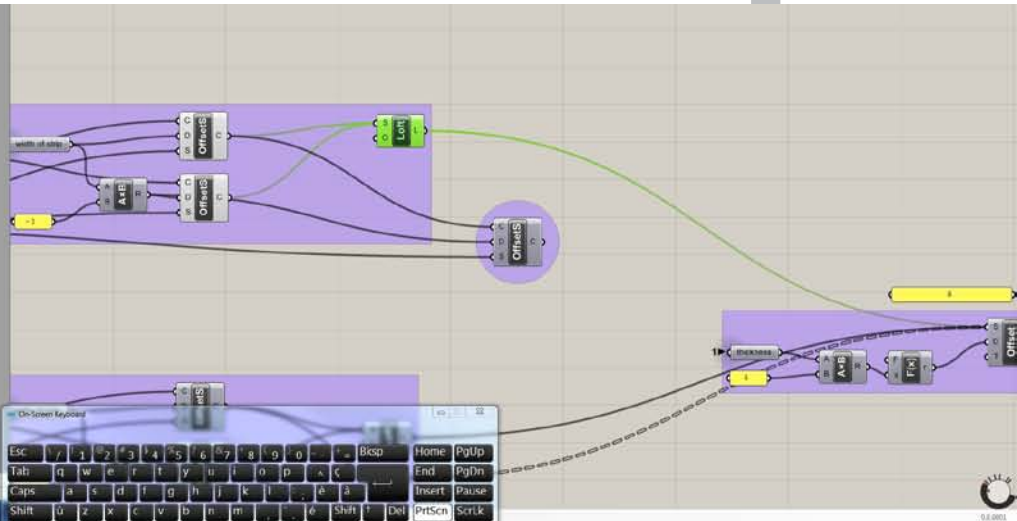
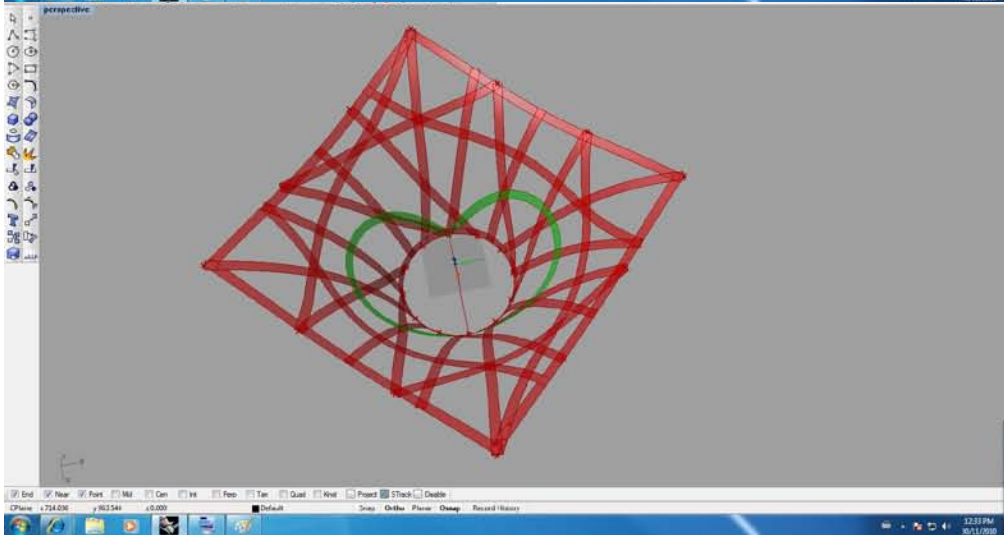
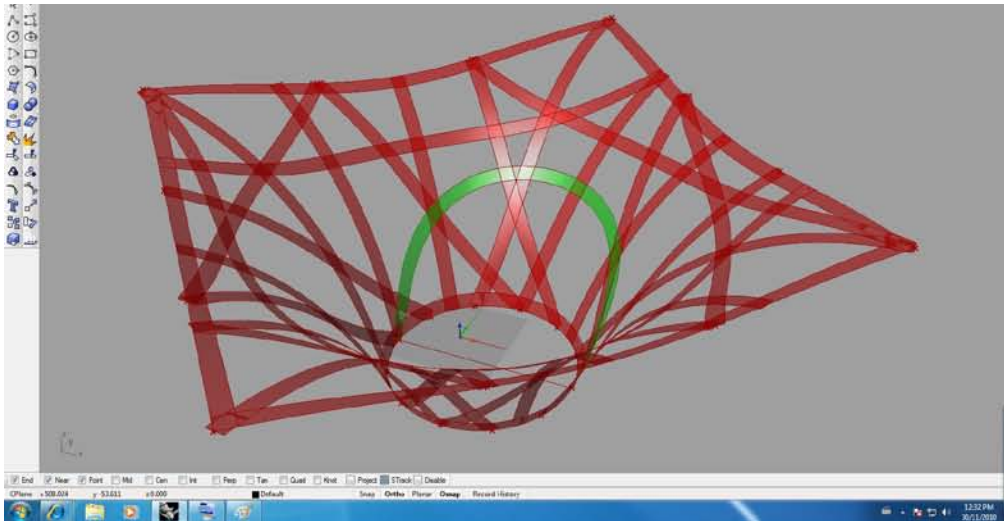
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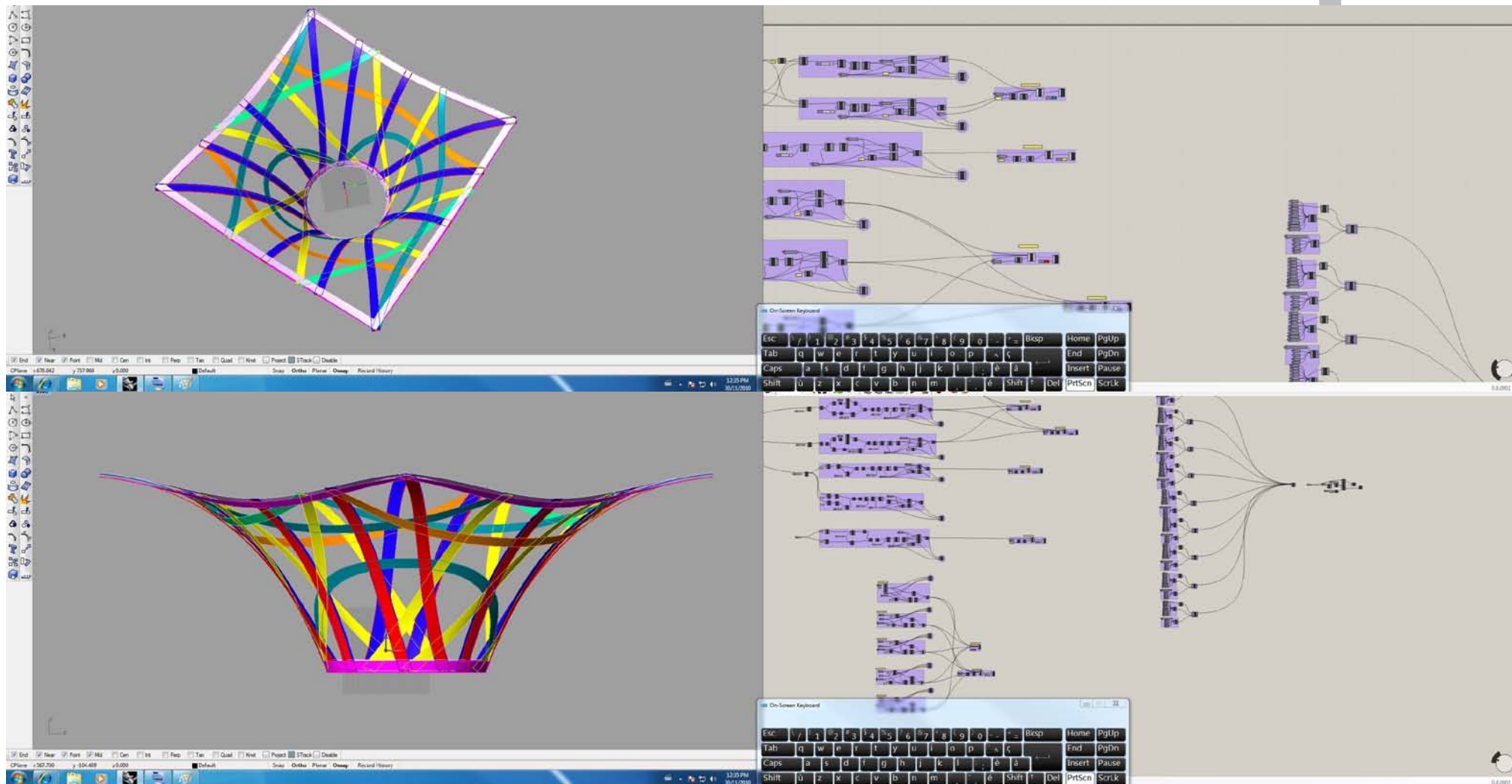
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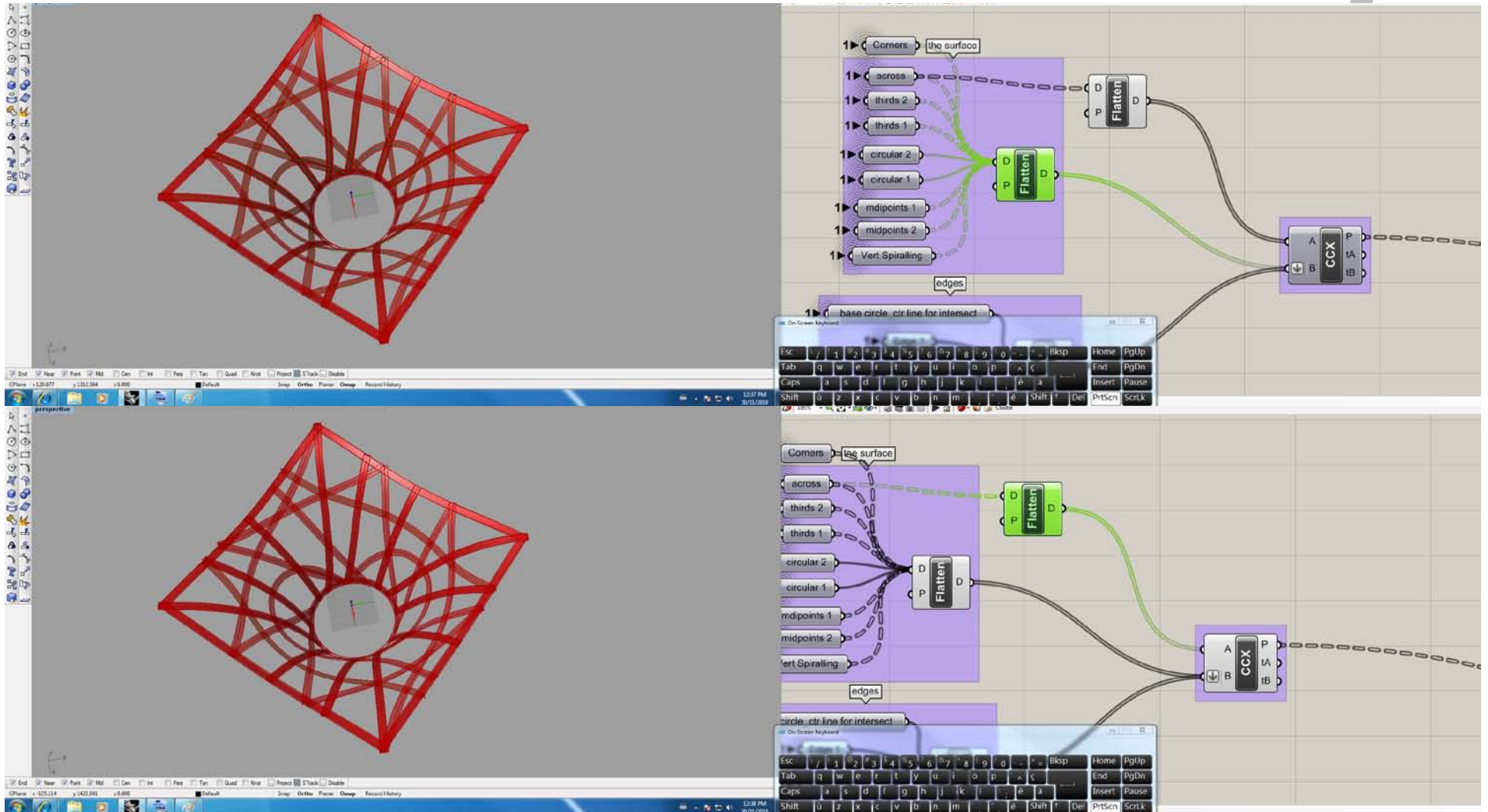
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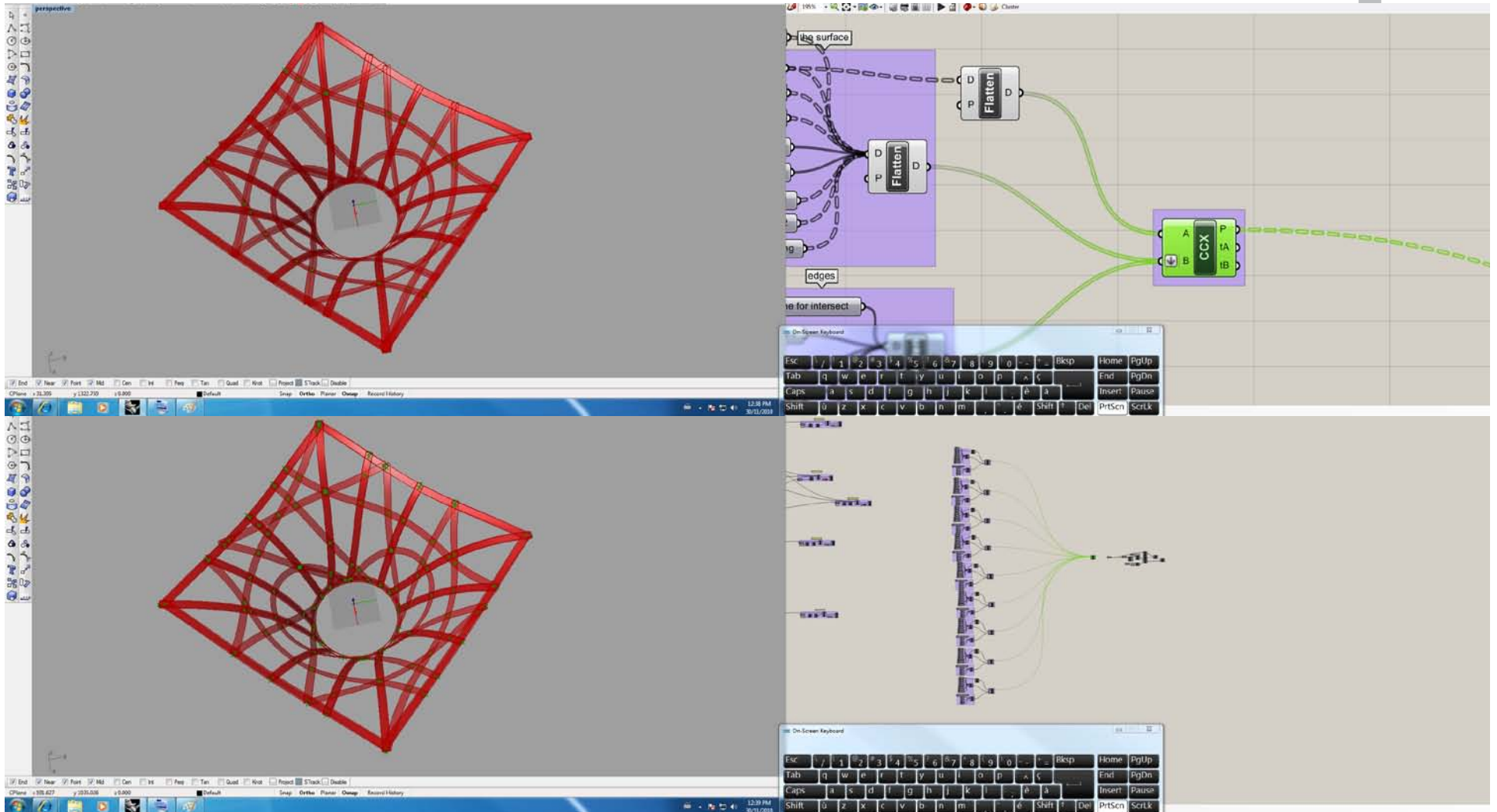
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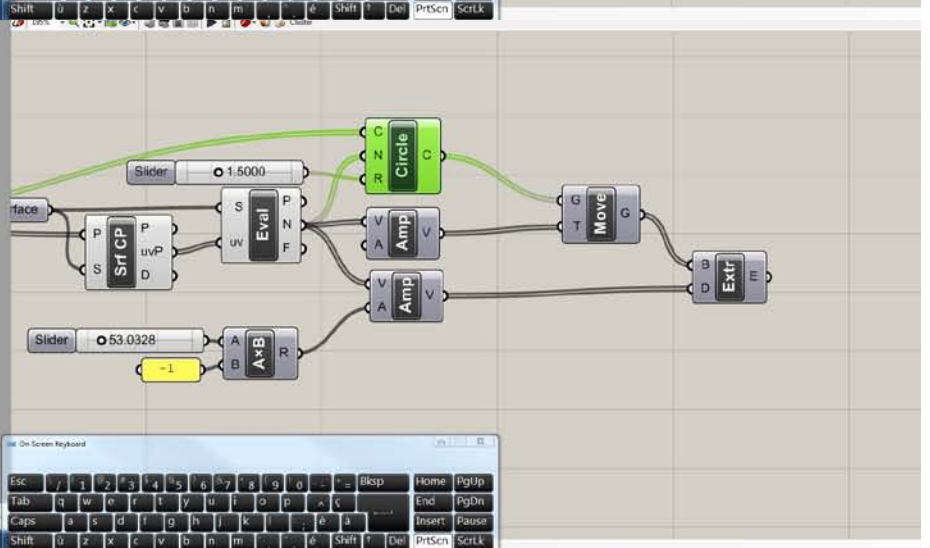
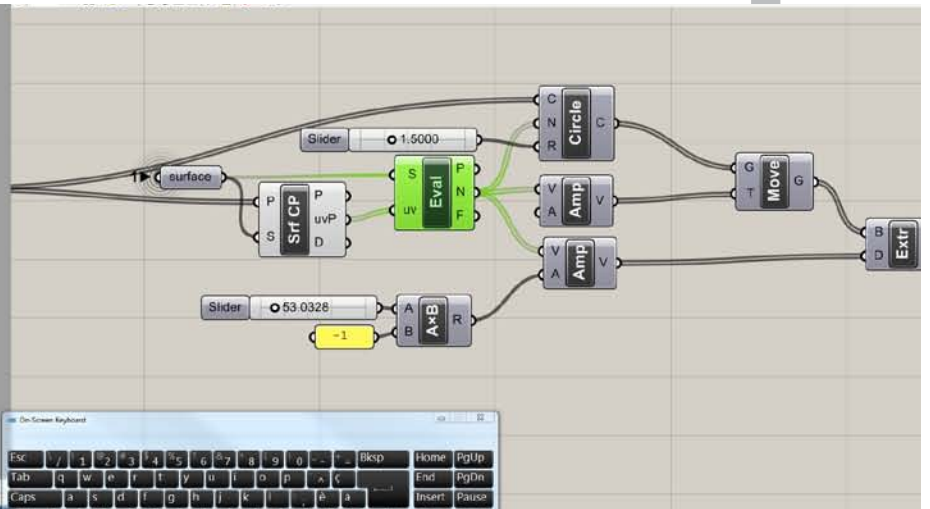
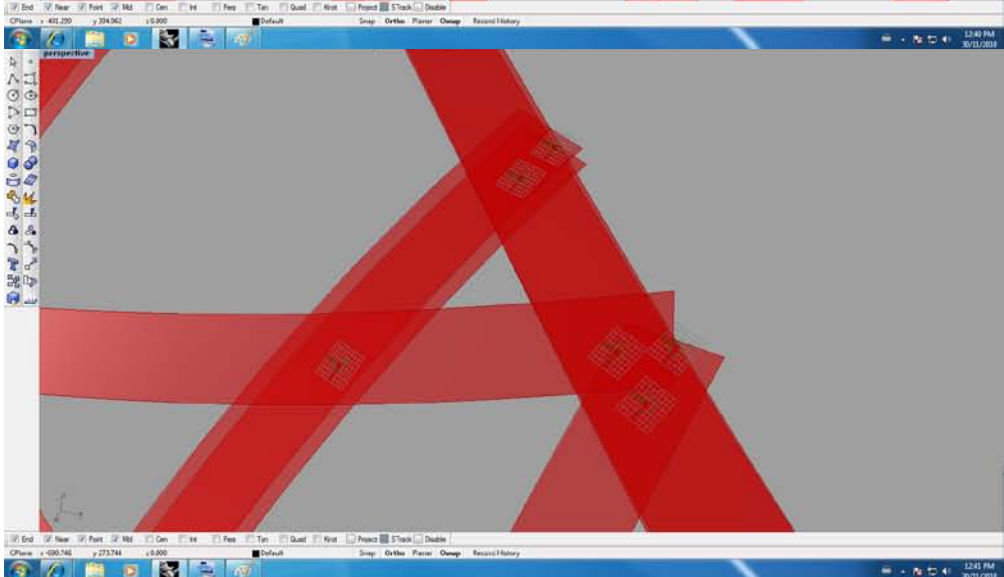
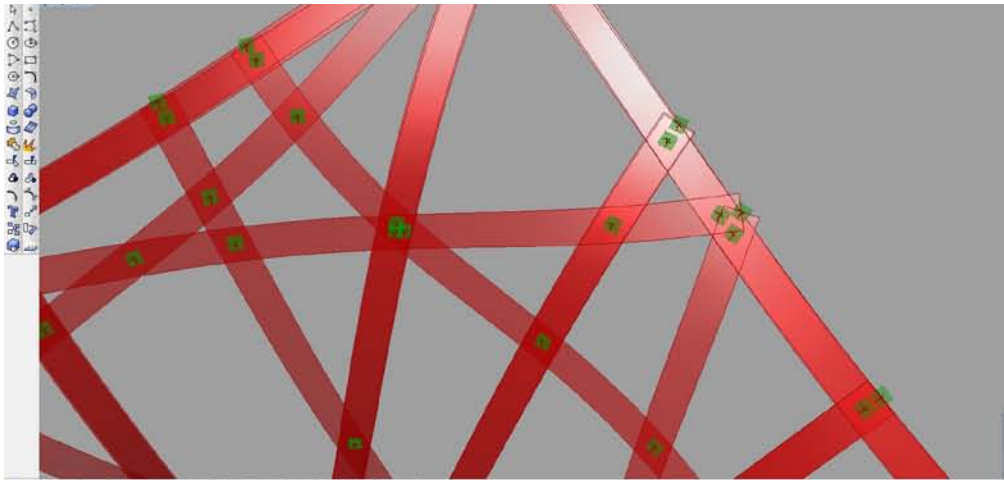
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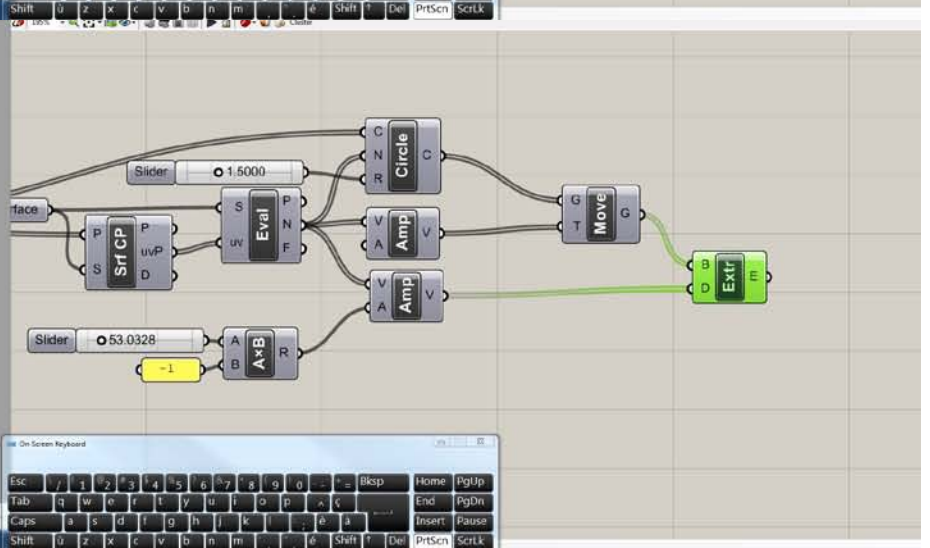
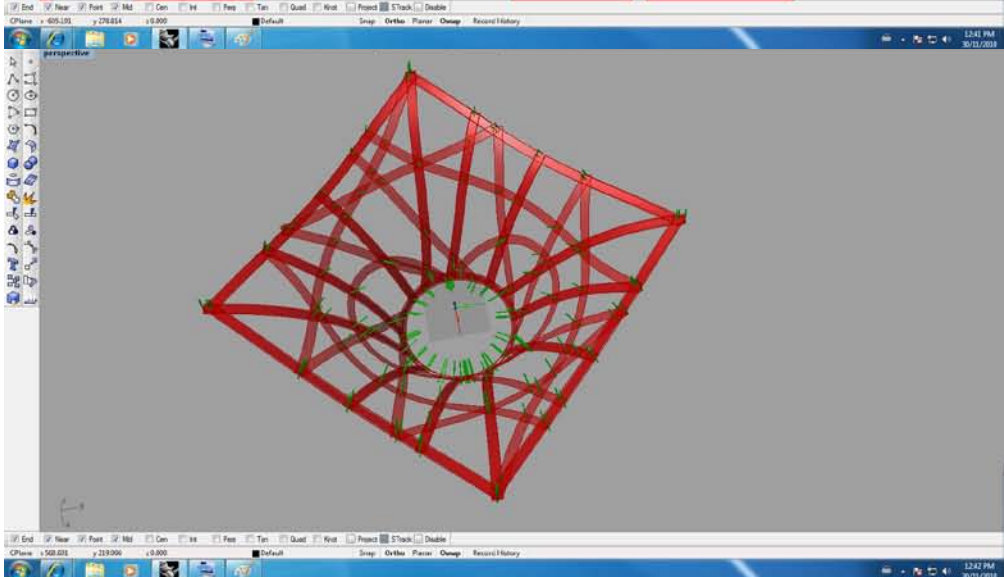
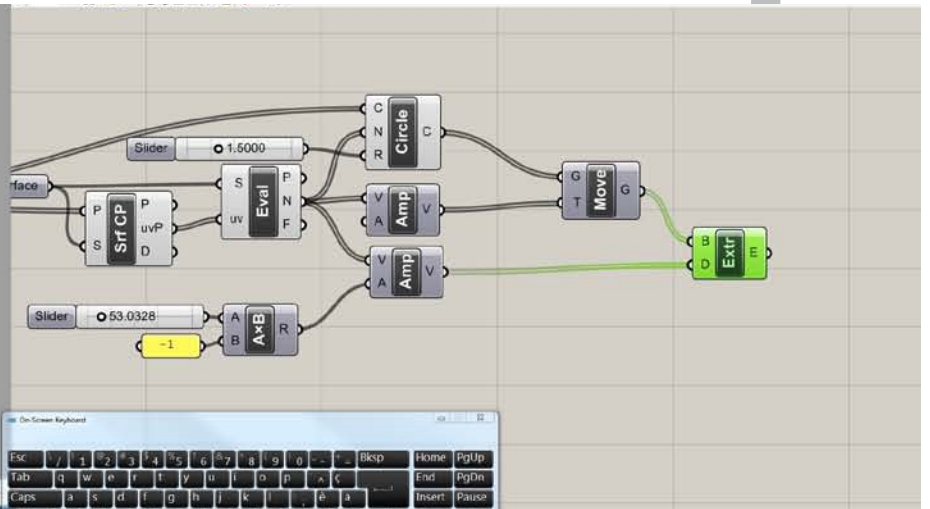
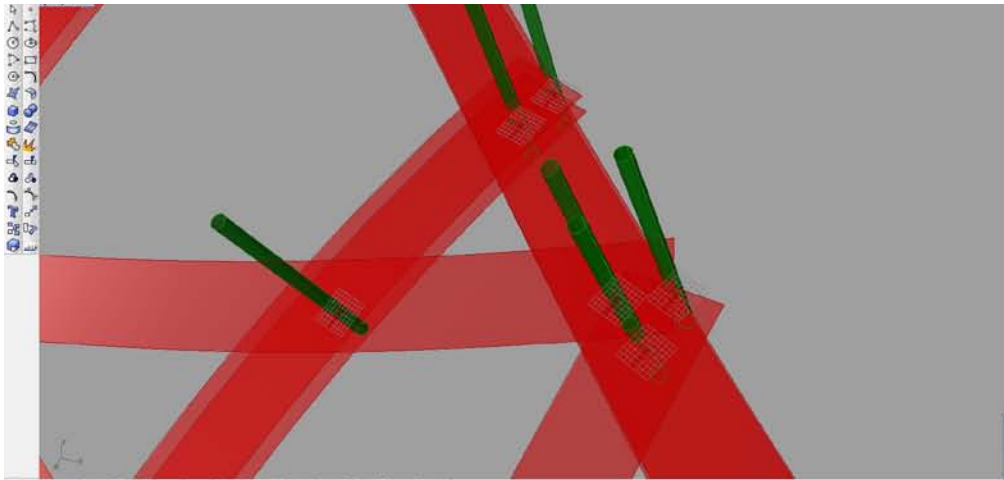
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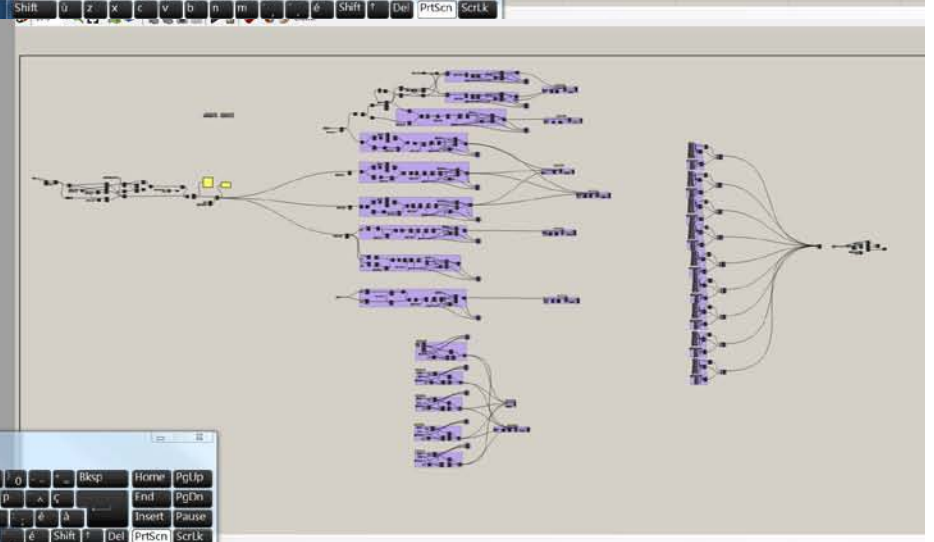
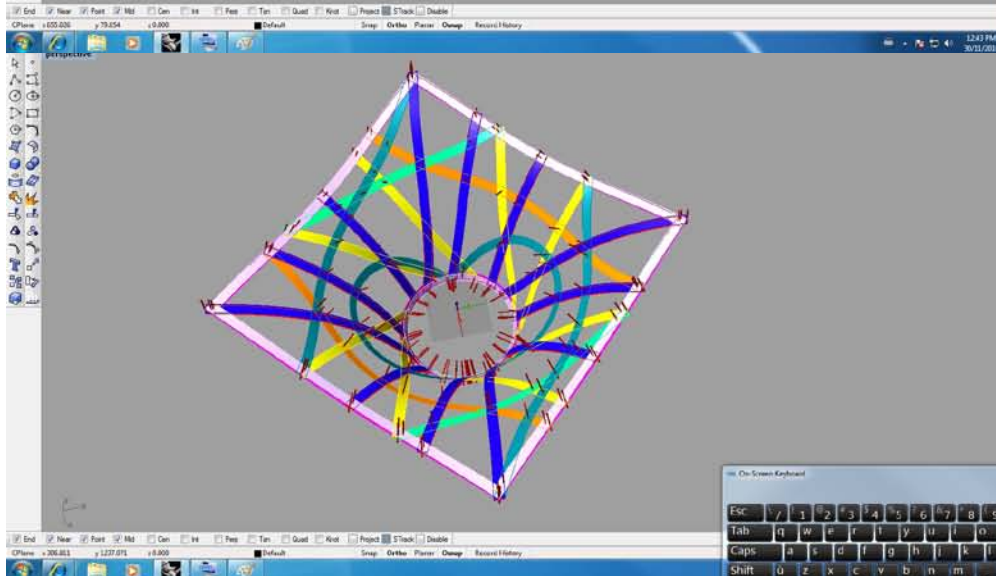
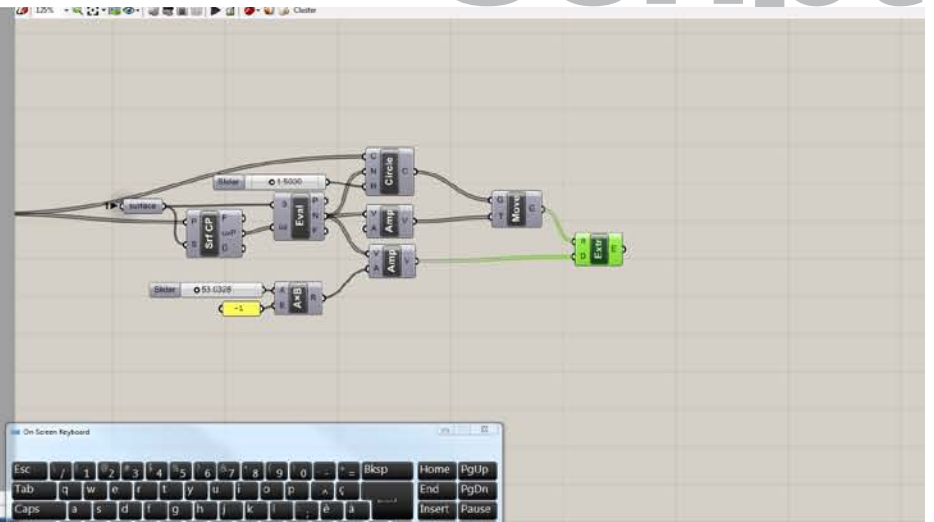
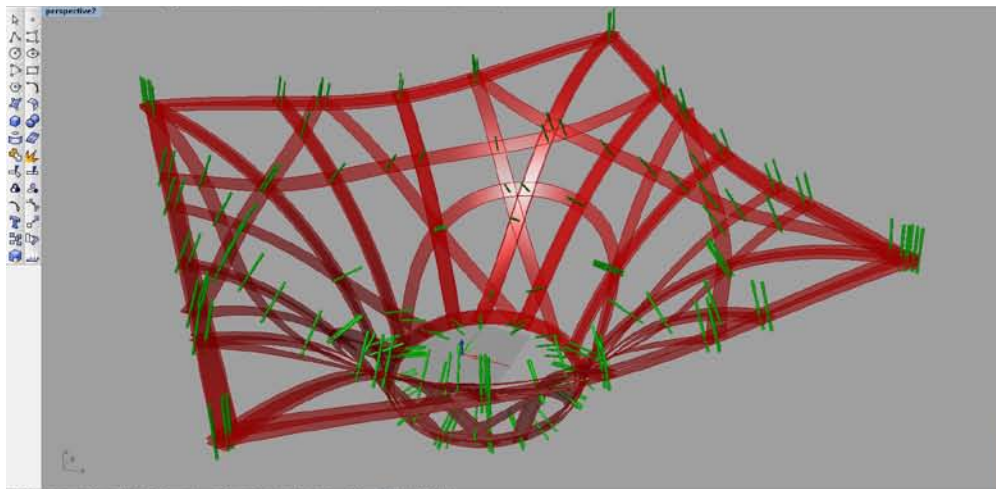
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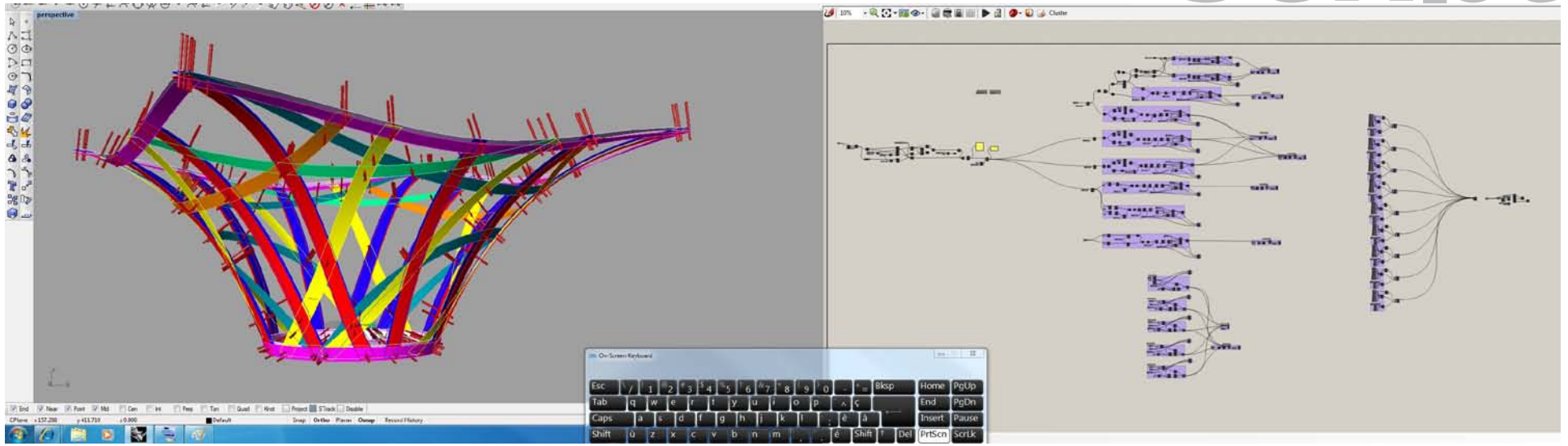
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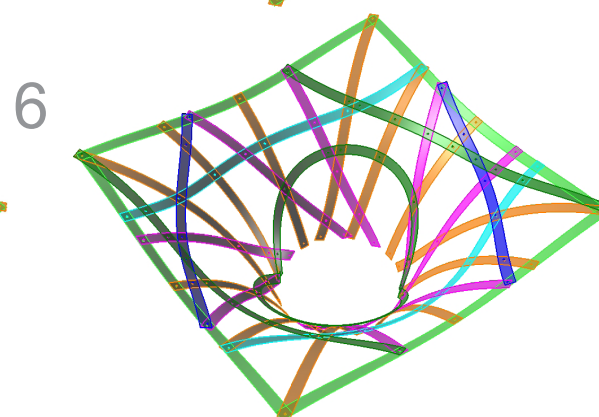
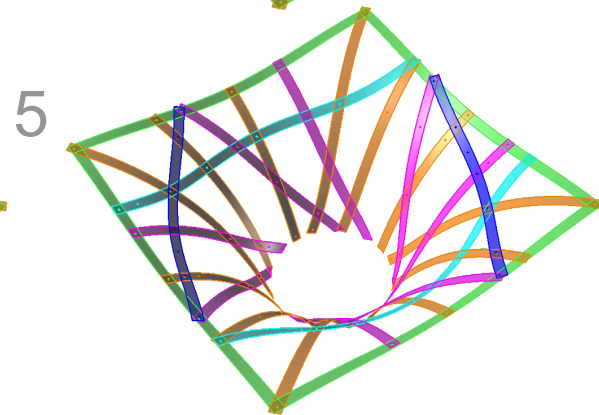
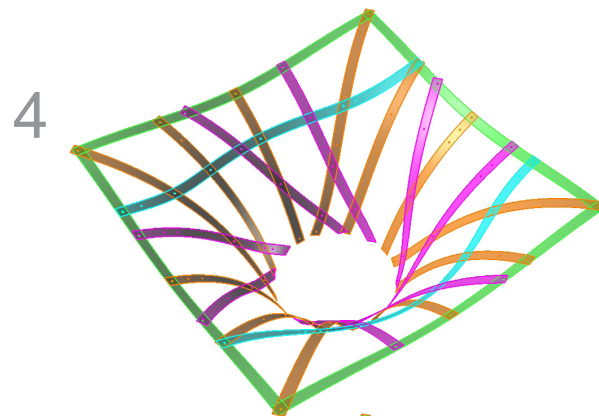
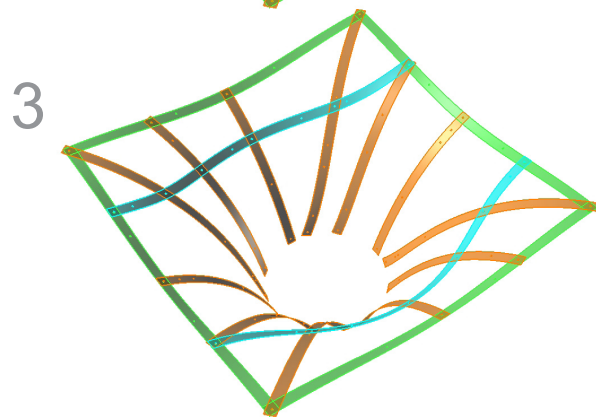
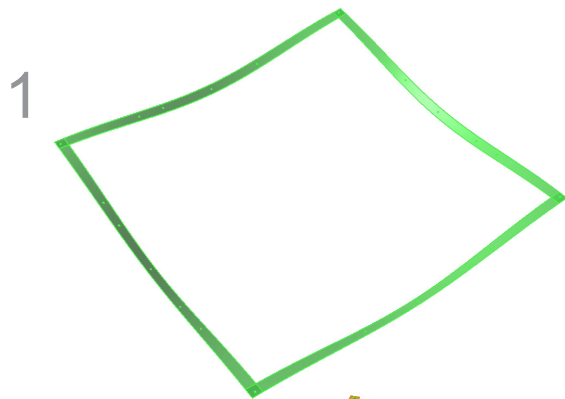


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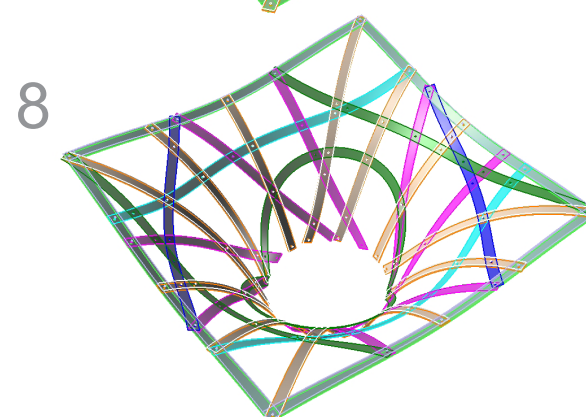
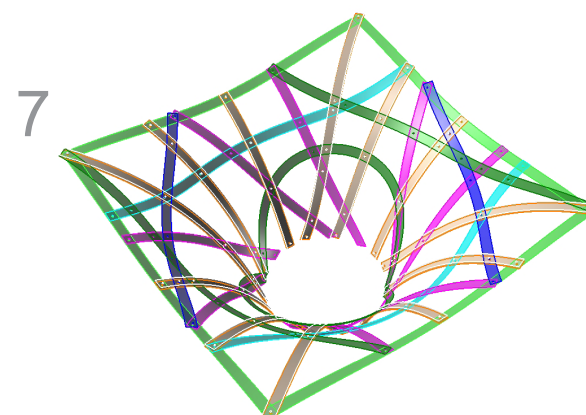


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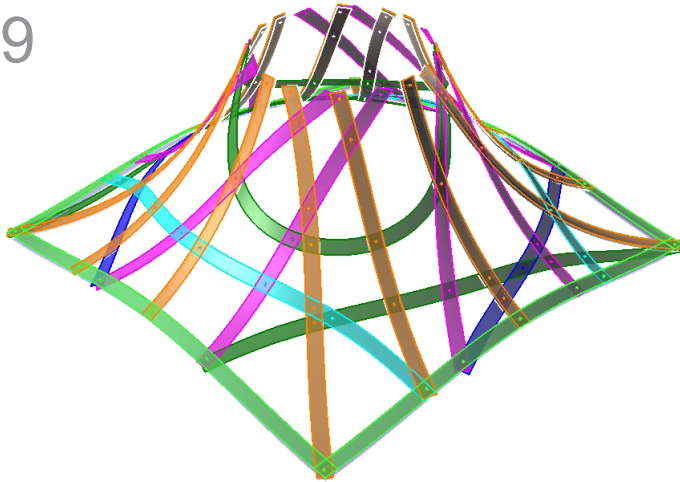




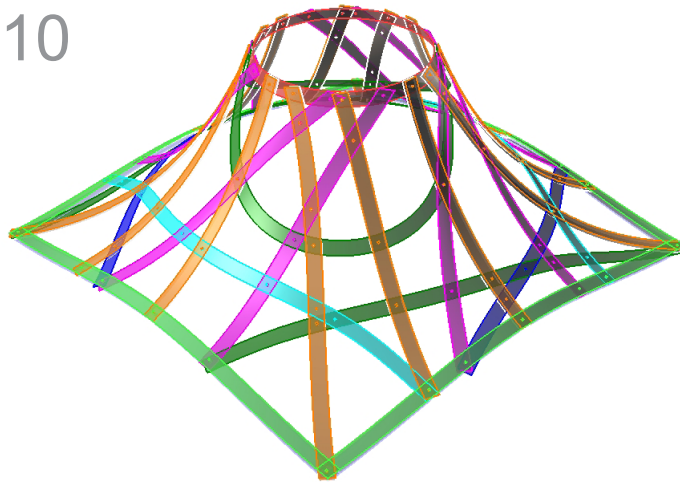
build up



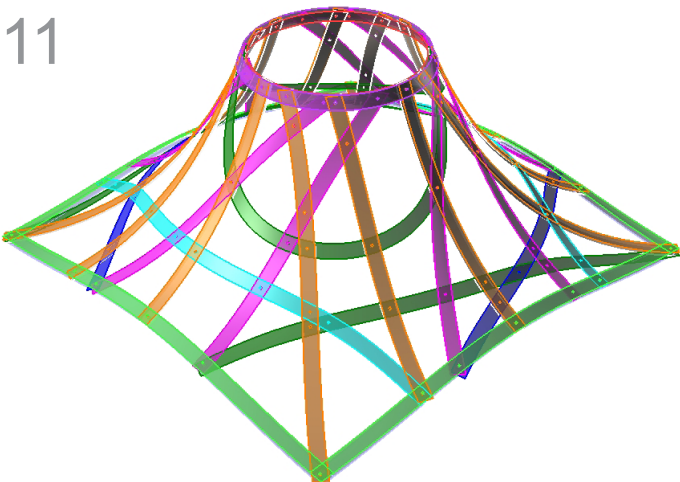
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10



11



build up

assembly

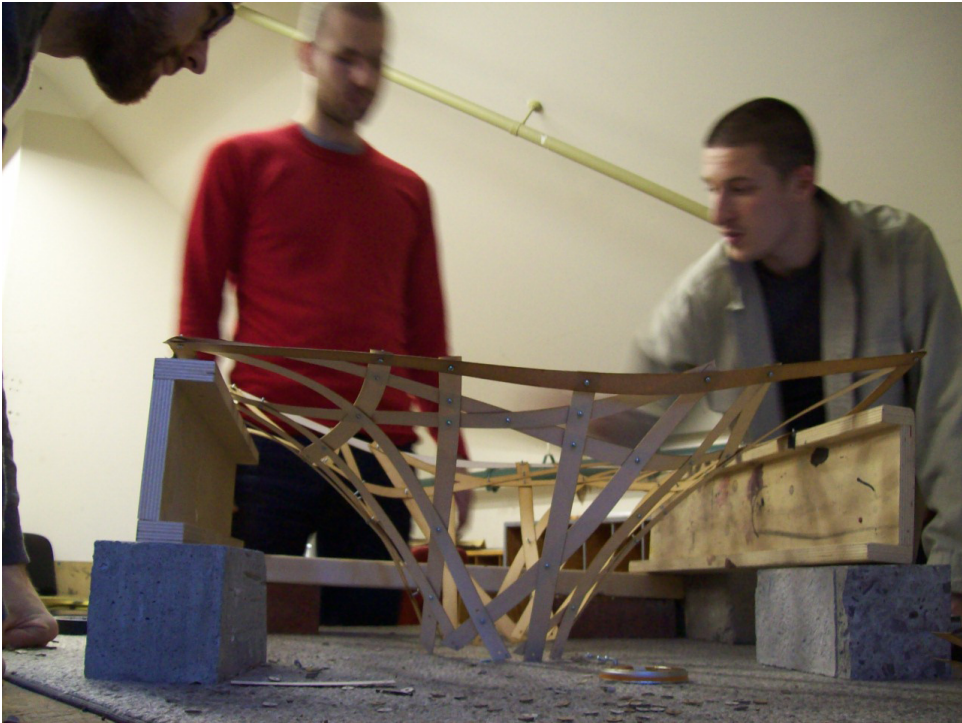


TEMPORARY FORM: a temporary wood supporting formwork was erected to support the lattice during construction.



SQUARE EDGE: Layers were added beginning with the square top edge.

assembly

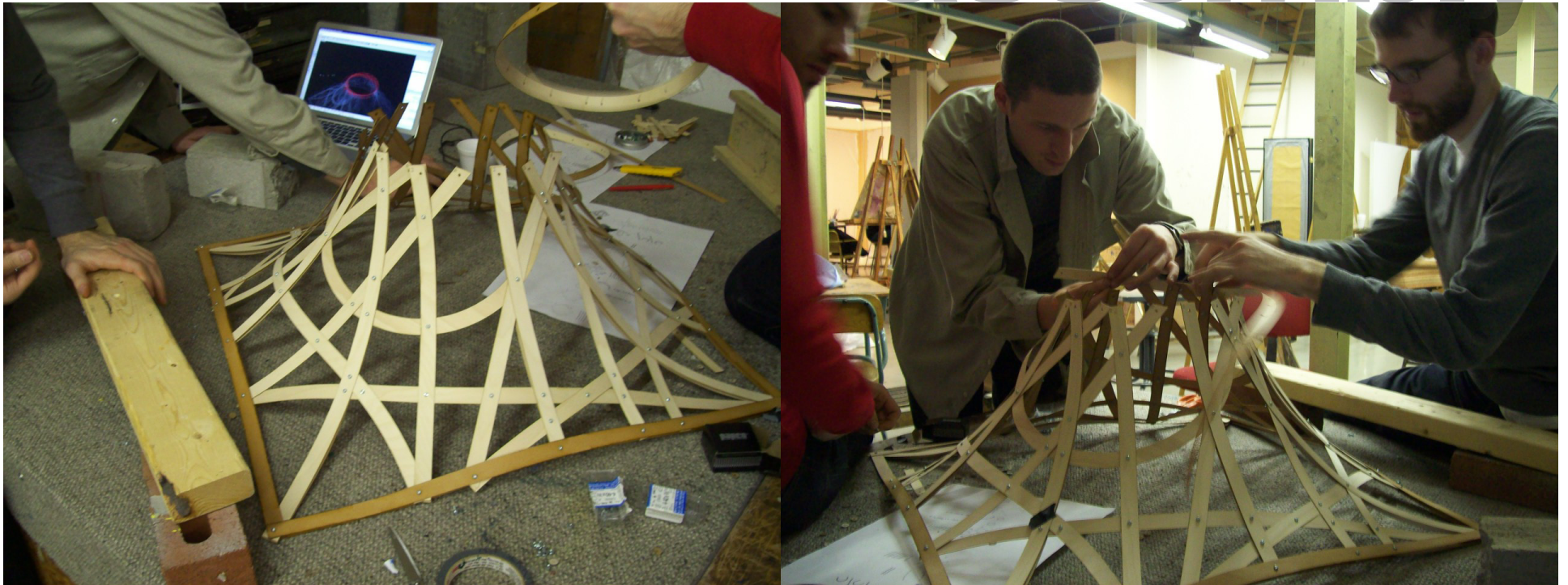


RIGID STRUCTURE: After all side layers were laid, the lattice became self-supporting.



FLIPPING THE MODEL: the model was flipped to continue on the bottom edge.

assembly



RHINO MODEL REFERENCE: the physical model was assembled using the rhino model as a reference to check member locations and directions.

CIRCULAR EDGE: Final piece, the bottom edge tension ring holds sides together and imparts stiffness and rigidity.

assembly

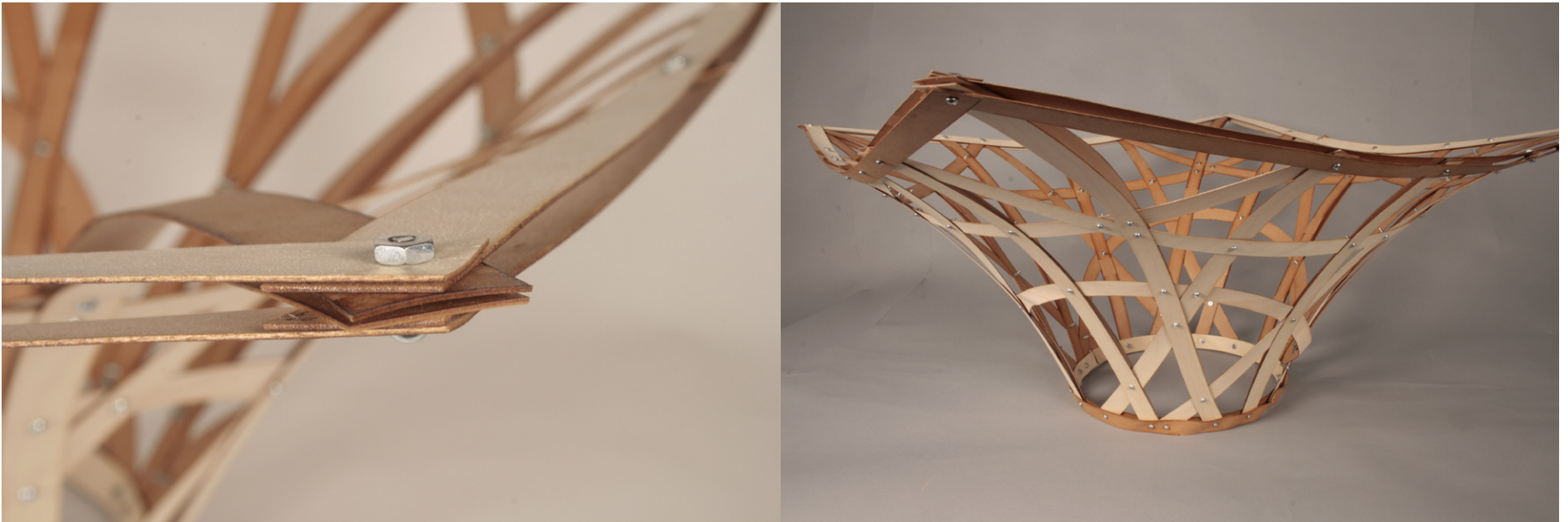


NUT TIGHTENING: final tightening of the nuts and bolts stiffens the structure.



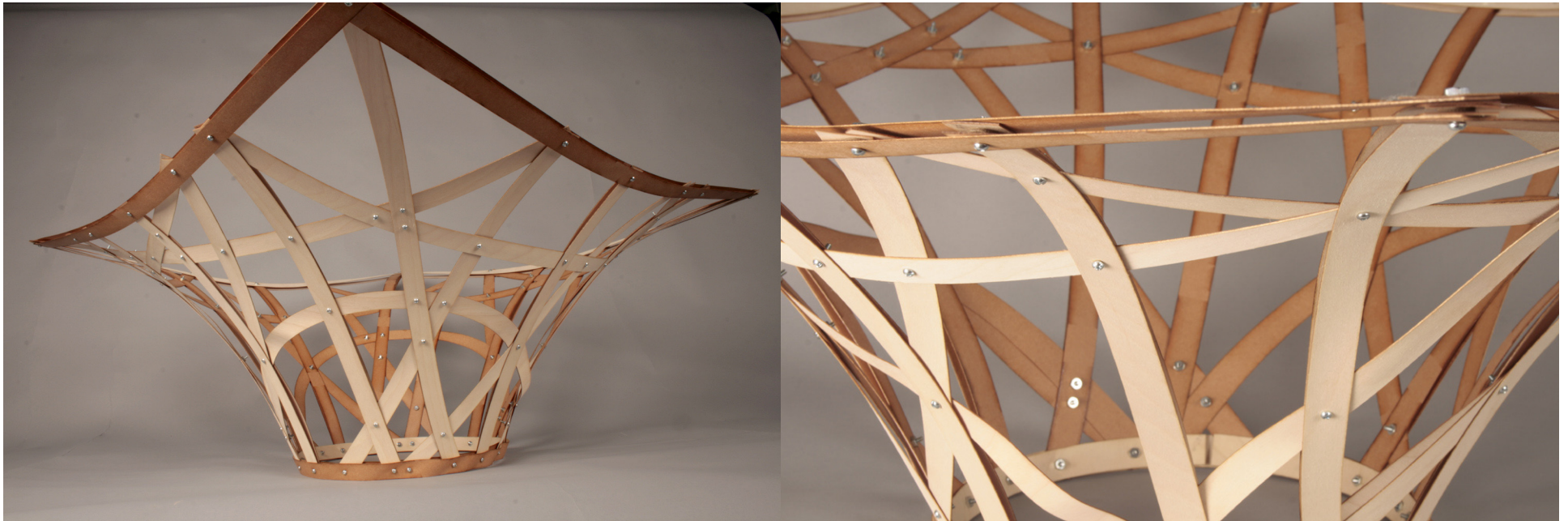
FINAL MODEL: self-supporting wood veneer lattice structure.

final model



FINAL MODEL: self-supporting wood veneer lattice structure.

final model



FINAL MODEL: self-supporting wood veneer lattice structure.

budget



\$12.00 - **joint tests**; 1 sheet veneer, re-use of left over bolts & zip ties from previous project

\$21.23 - 120 **nuts & bolts**

\$36.00 - three **veneer sheets** at \$12.00 each

\$66.23 - total costs

Fewer layers in the lattice allowed for material savings and resulted in only three sheets of veneer for the final model.