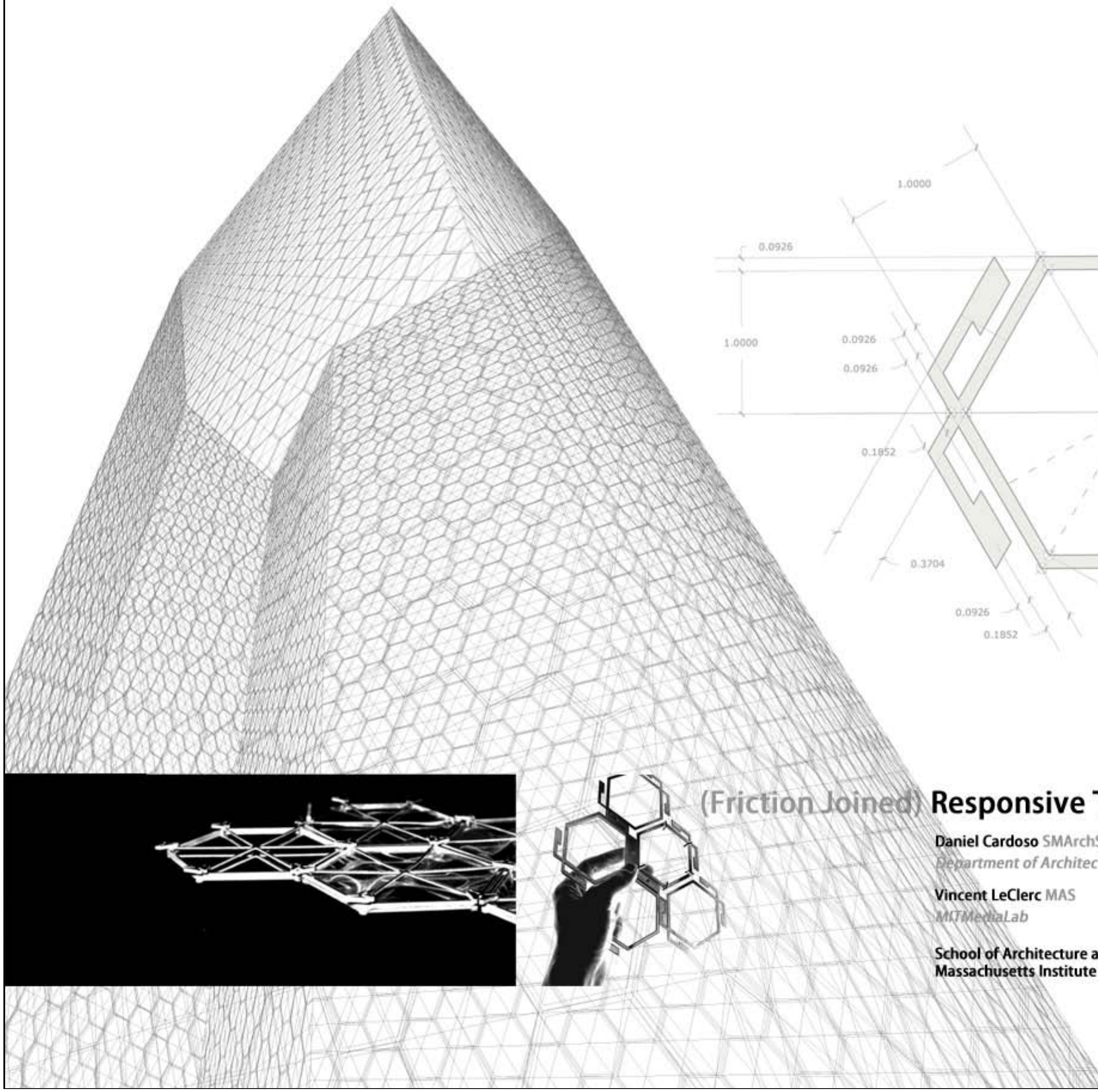
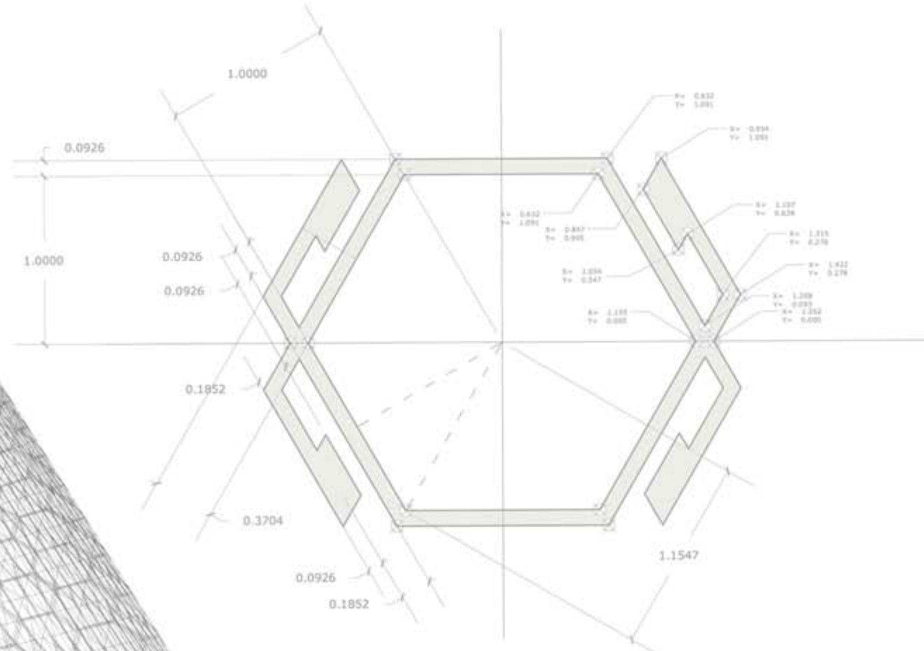


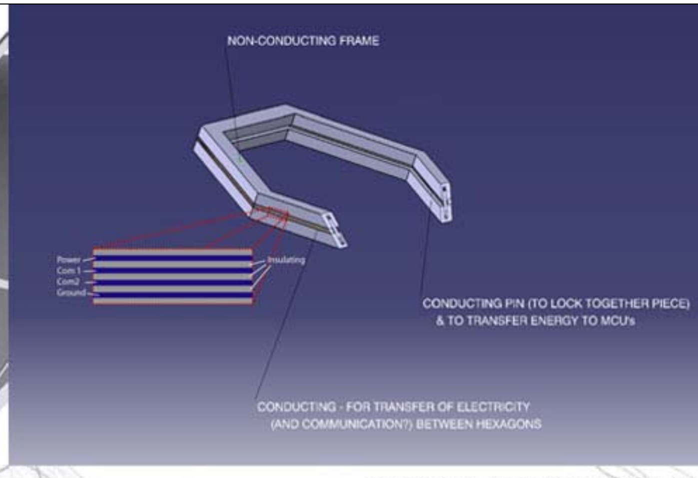


(Friction Joined) Responsive Tower

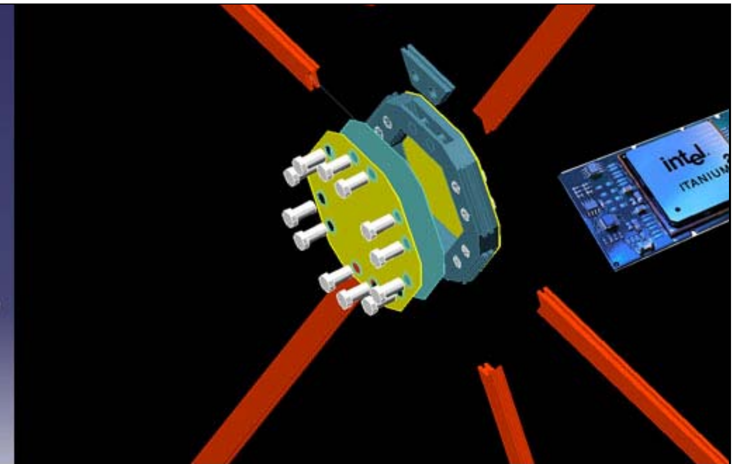
Daniel Cardoso SMArchS - Computation / **Dennis Michaud** MArch Level II
Department of Architecture

Vincent LeClerc MAS
MITMediaLab

School of Architecture and Planning
Massachusetts Institute of Technology



The facade structure carries load electricity



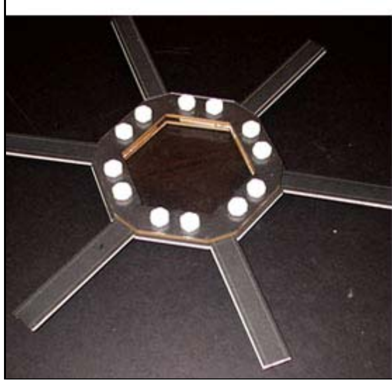
Computation power as an architectural layer

(...) 'What about the phenomenological experience of being in a new augmented space? What about it's cultural implications? What about it's poetics and aesthetics? One way to begin thinking about these questions is to approach the design of aufmented space as an architectural problem. Augmented space provides a challenge and an opportunity for many architects to rethink their practice, since architecture will have to take into account that layers of contexttual information will overlay the built space.

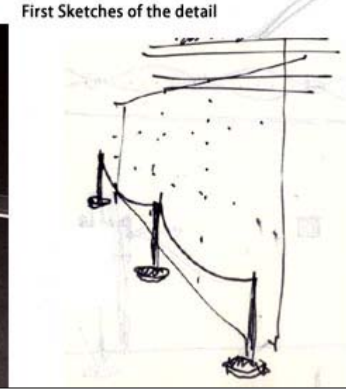
Lev Manovich, The Poetics of Augmented Space

The results of embedding cutting edge digital devices in a piece of architecture poses design problems that form part of a very old aeshetic paradigm: how to combine different spaces together.

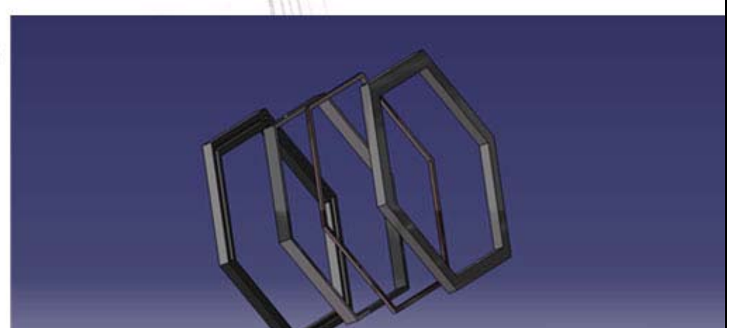
Our proposal acknowledges the fact that the New York Times is the top information provider in the world by using the ETFE pillow elements as interactive shaders during the day, and as a urban-scale LED display during the night.



First Sketches of the detail



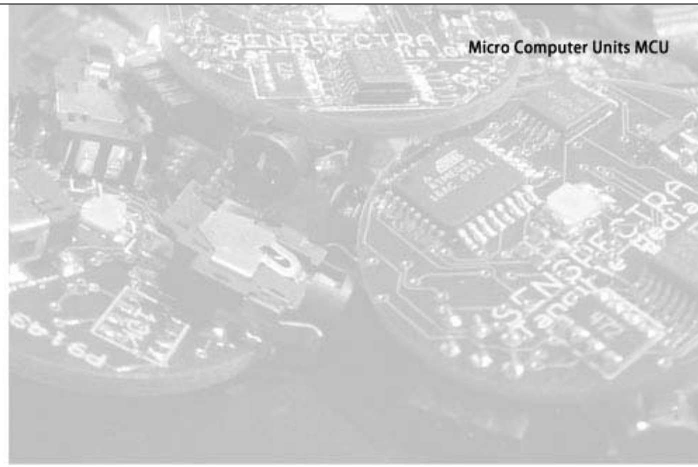
Design **Interaction**

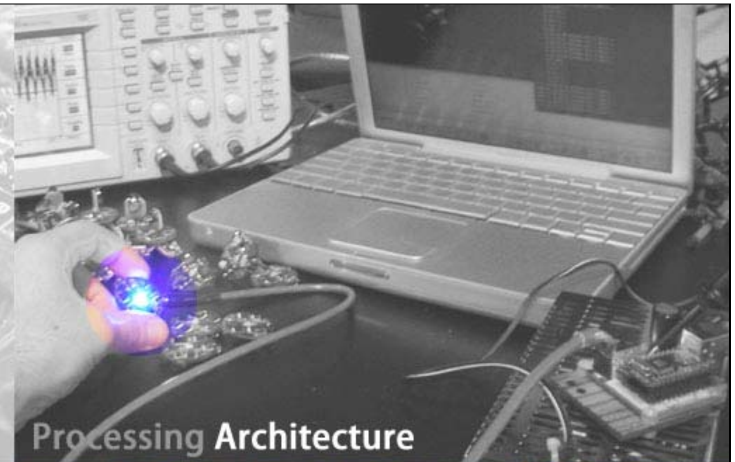


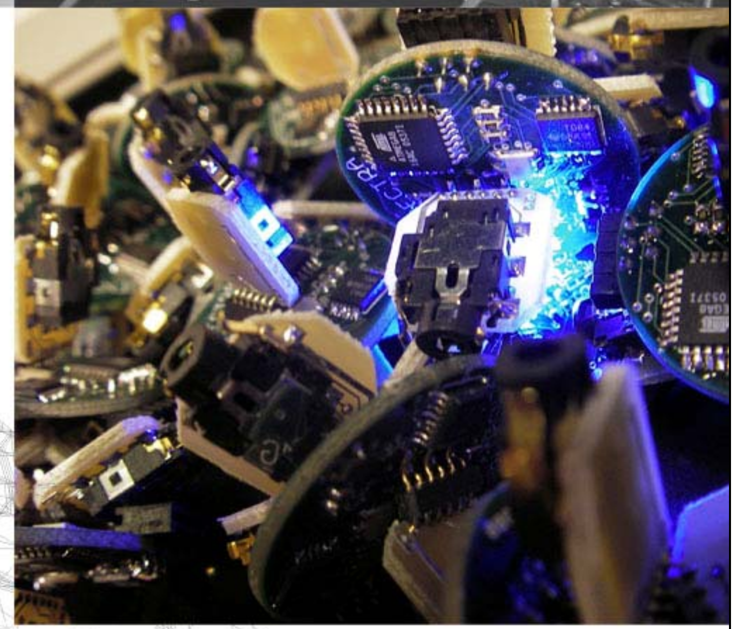
Different layers for different networks

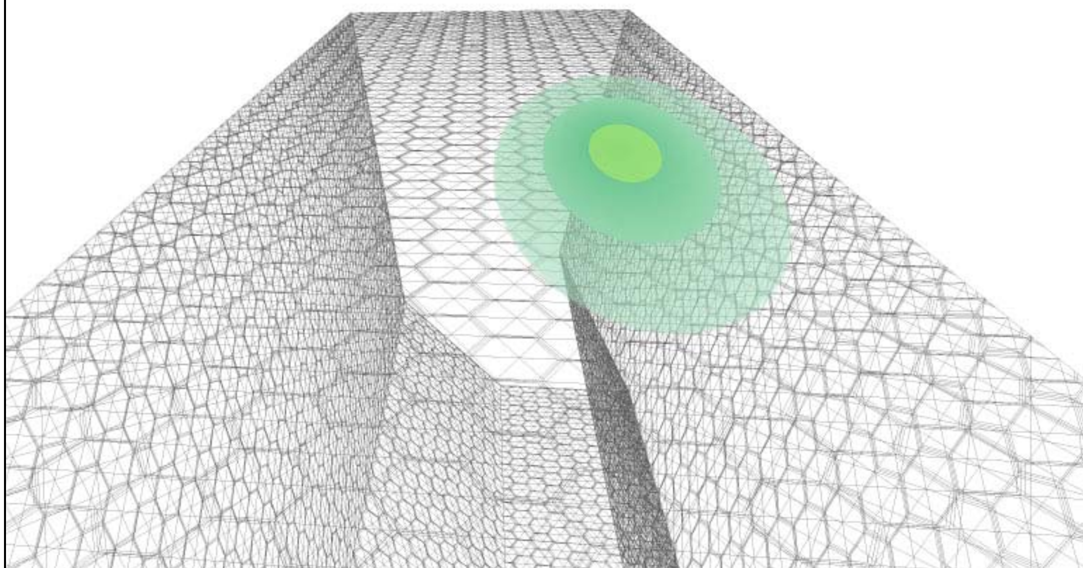
Processing Architecture

Micro Computer Units MCU







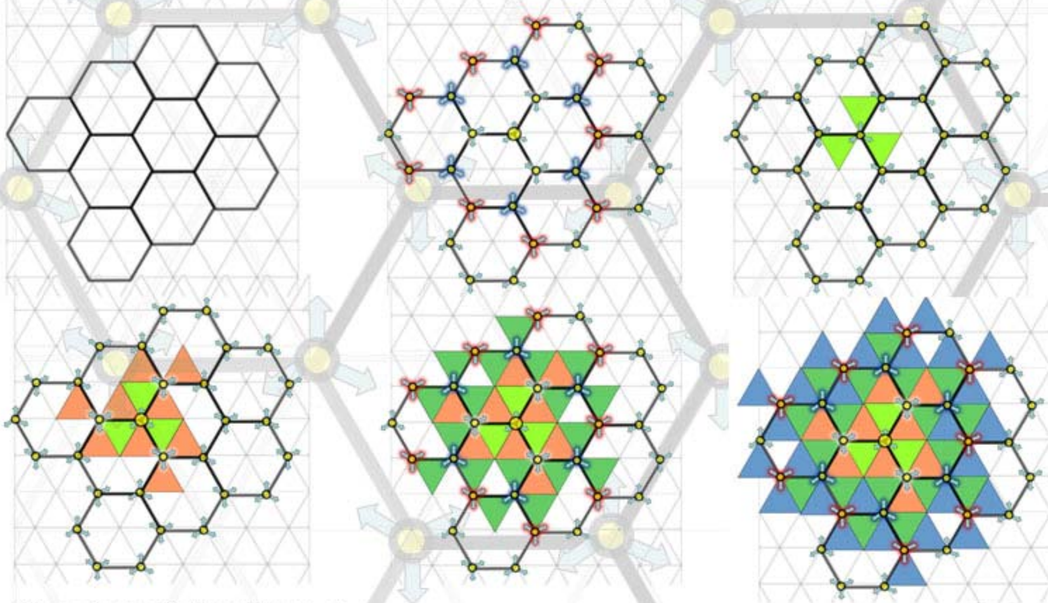


Breakthrough research at the MIT MediaLab in the Tangible Media Group allow for cheap tiny microprocessors to communicate and interact without a single central processing unit. This configuration creates a distributed network that is more stable and resistant to damage, and that allows for a wide variety propagation behaviors.

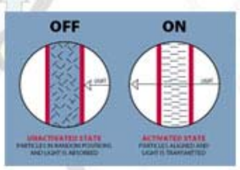
The use of MCUs (Micro Computer Units) as one technical component of the facade proposal takes advantage of this computational power in order to act both locally as a Smart Window generator and globally as an urban scale LED display.

Vincent!

Bits meet Structure



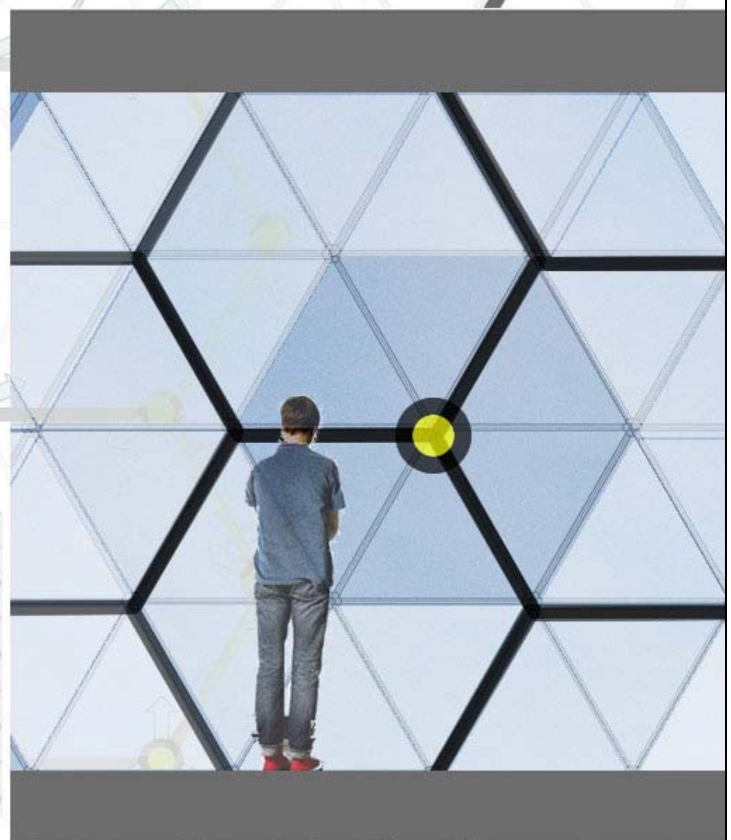
Scheme of propagation through the network

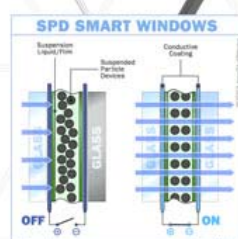


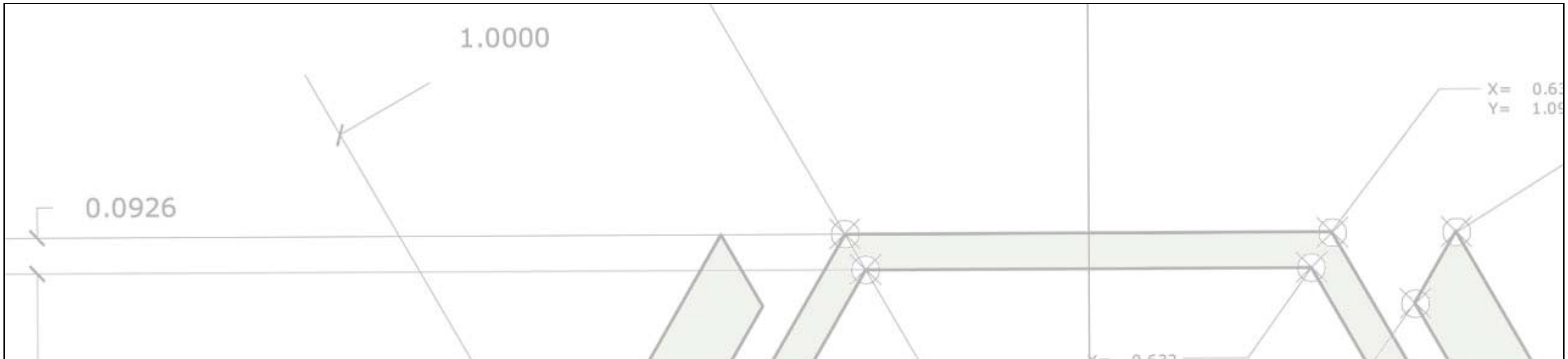
howstuffworks.com

The architecture of the network allows each node to connect to three different ETFE pillows, sending an electrical charge that triggers the smart window. The degree of transparency of the pillow is given by the proximity of the pillow to the active node (the node that a person touched). Such is the behavior in the local condition of the system.

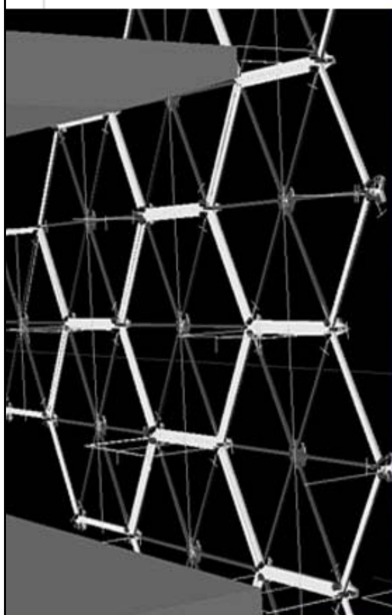
The global condition is intended for the LED display; when the building starts radiating information, the orders of the messages override the local requirements of the interior.

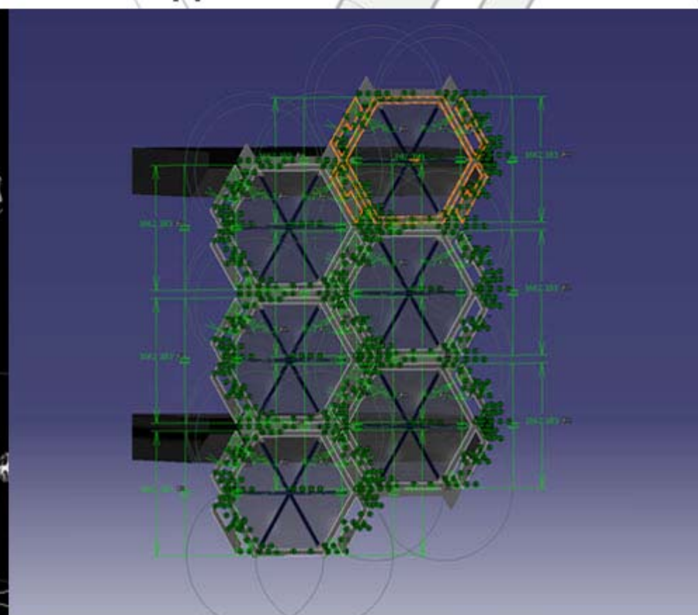


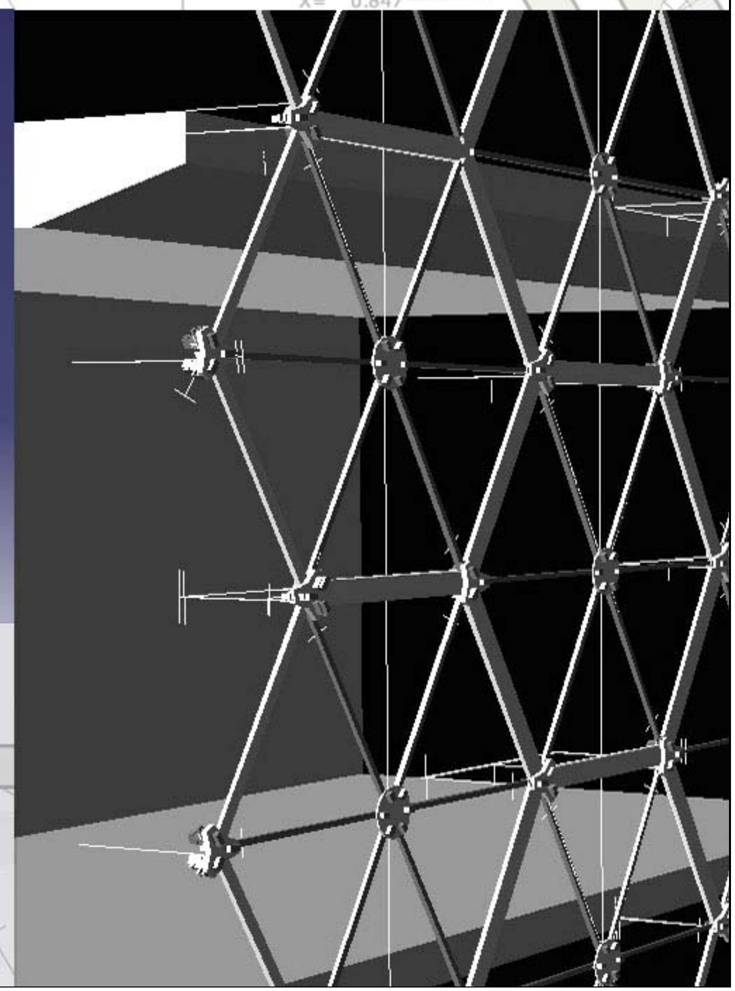


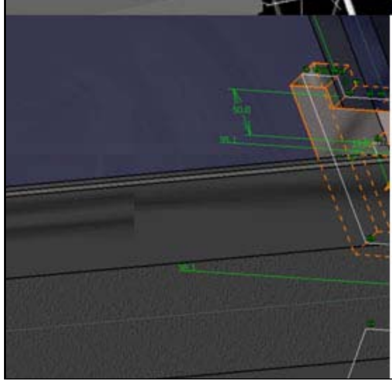


Material Approaches

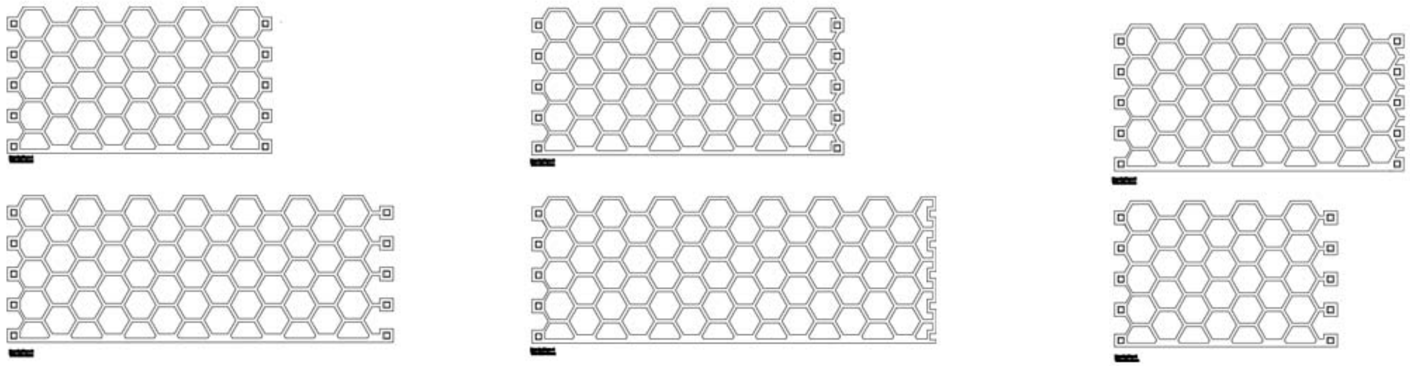






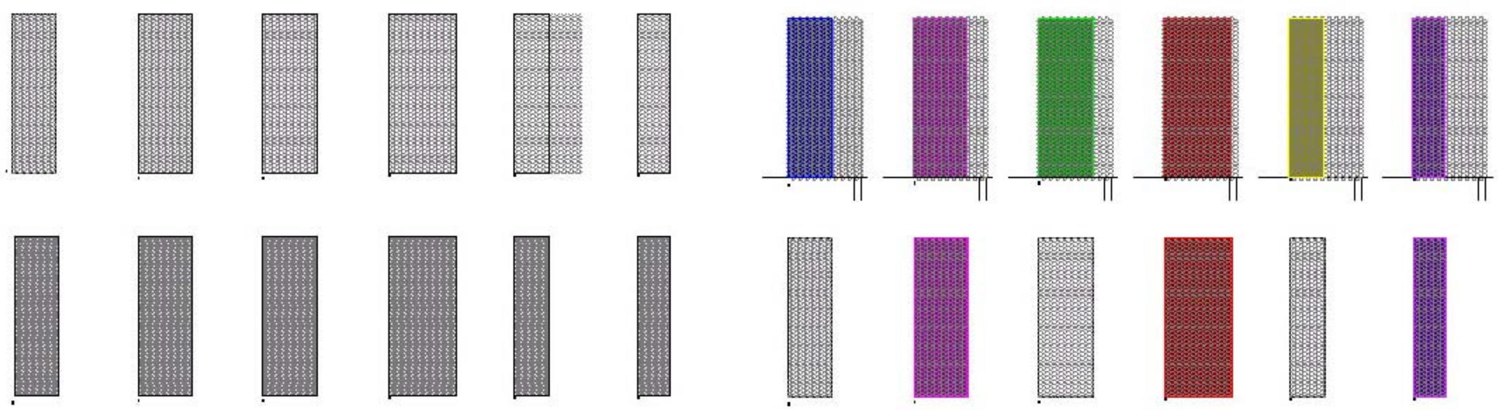


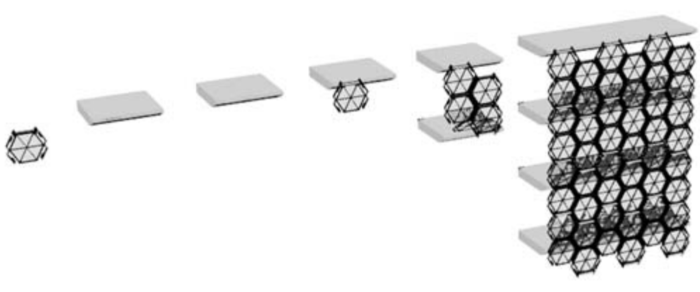
Two different approaches are developed, both of them following the constraint of using only 2d elements to construct the geometry.

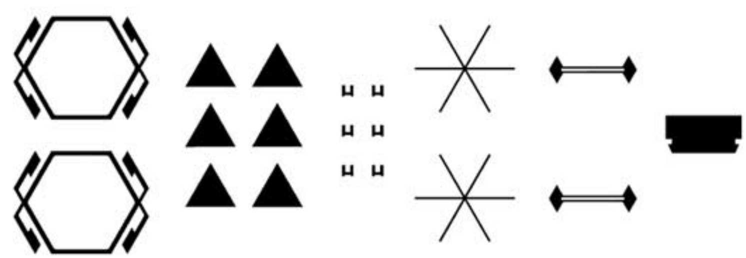


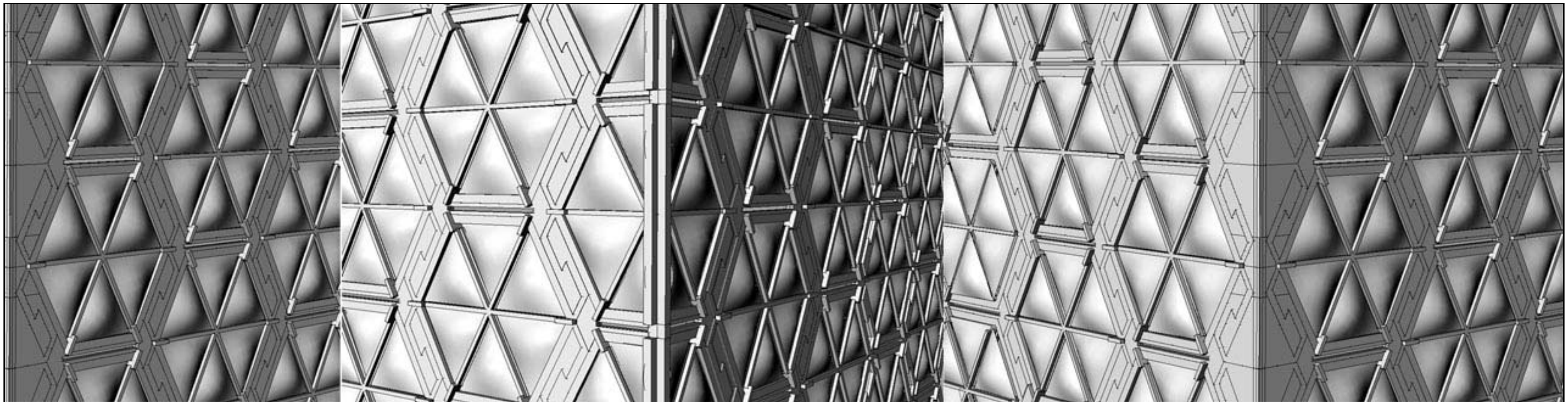
Planar Construction

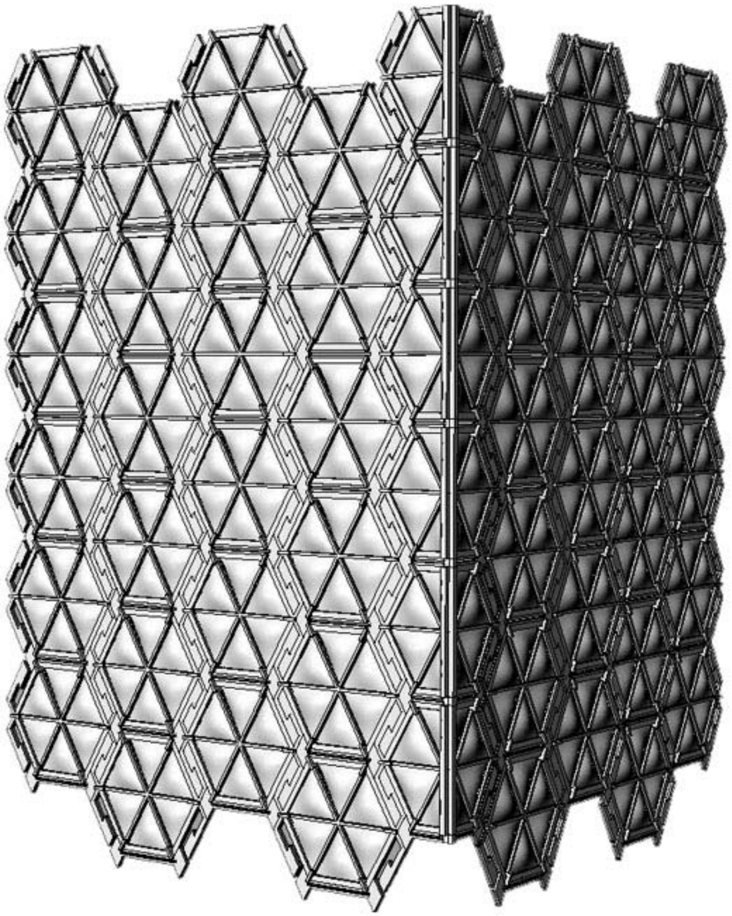
The scale of the final model allowed only to a certain degree of representation detail. Both, however, are fully buildable using only 2d pieces.





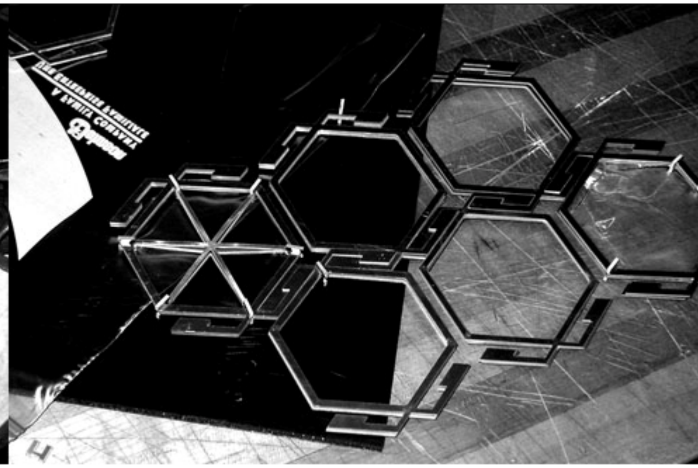


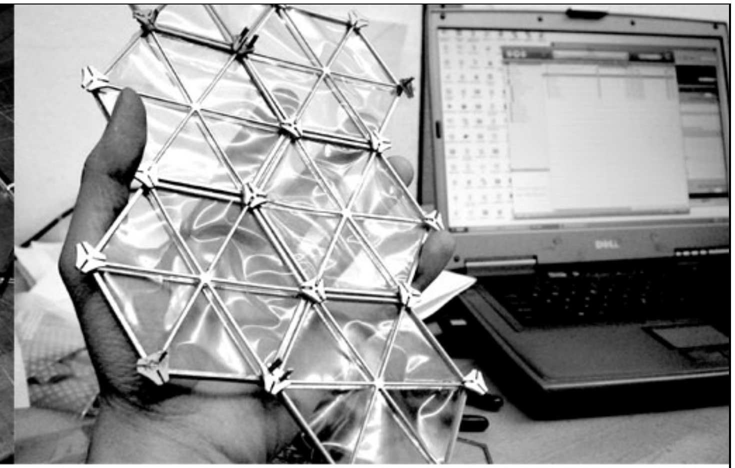




Several solutions to the corner are explored, changing the attachment condition in the edges. The answer to the question of where to cut the hexagon becomes an important visual and material consideration.

Corner Solutions



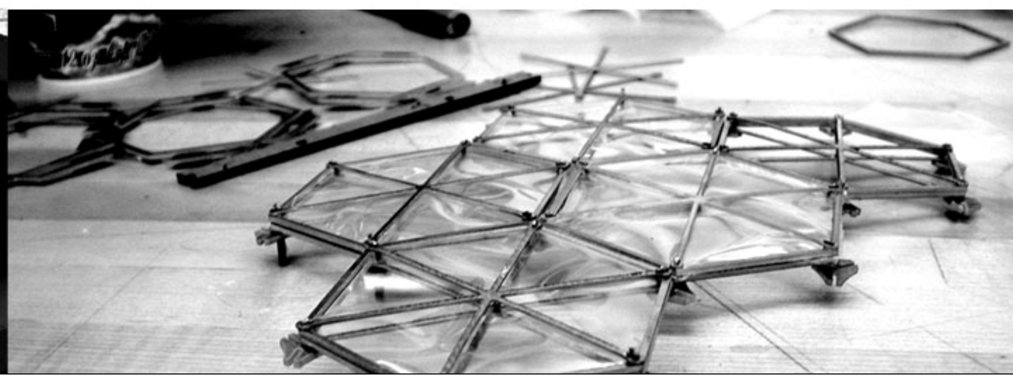


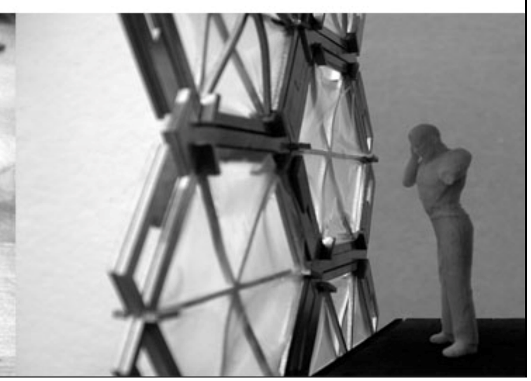
Several studio models are created through the process, using cheap materials on early stages of the design process in order to test the visual and technical properties of the proposals. The present models were both fabricated in 1/16 and 1/32 alluminum; as the material imposes it s logic on the design, new problems and opportunities unveil.

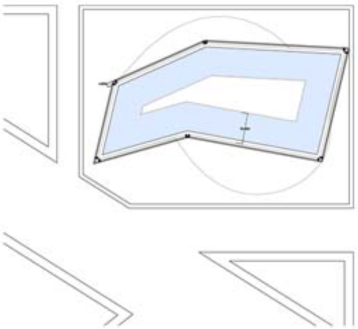
As a Next step, the proposals should evolve into a single design, where the clipped approach of the clip detail is improved in terms of efficiency of material to a point of slenderness similar to the other detail.

The tolerances of the material need to be considered more accurately, and the corner condition of the structure needs to be resolved.

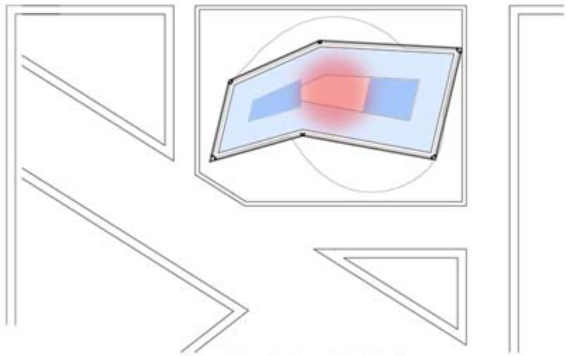
Fabricating the Models



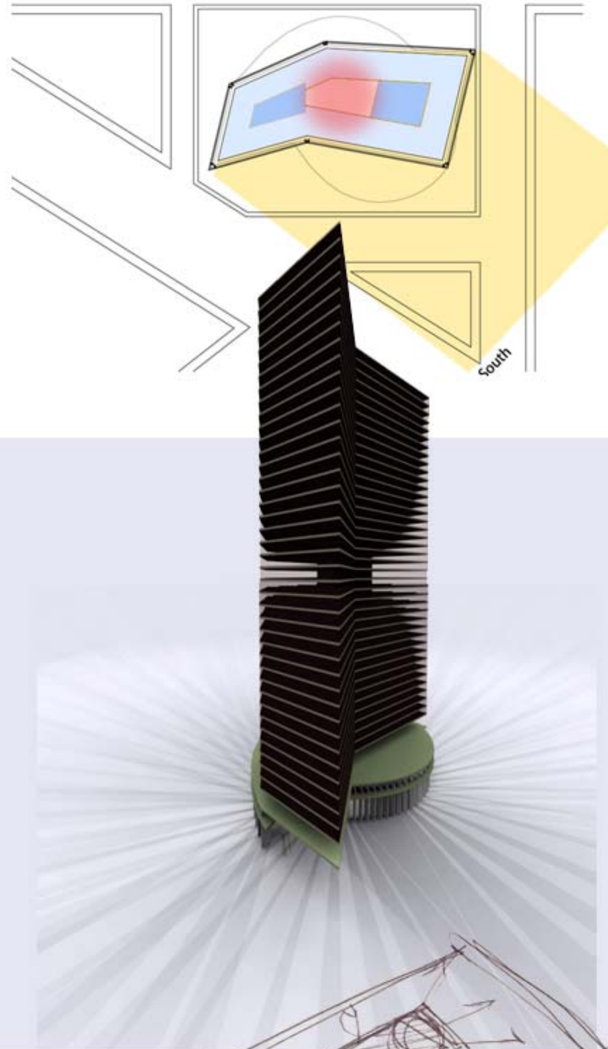


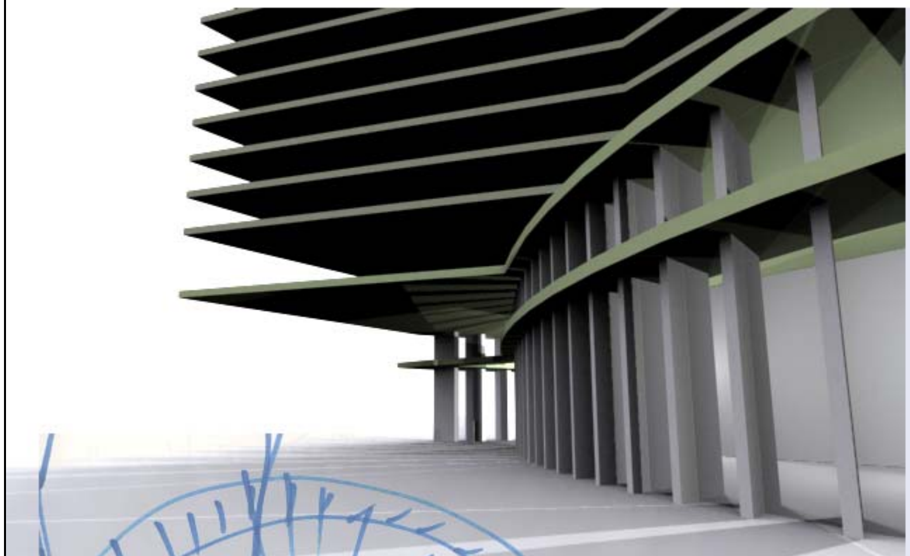


Floorplan Area : 24 039 sq ft
Core Area: 5 965 sq ft - 27.04 %
Maximum Core-Facade distance : 42 ft

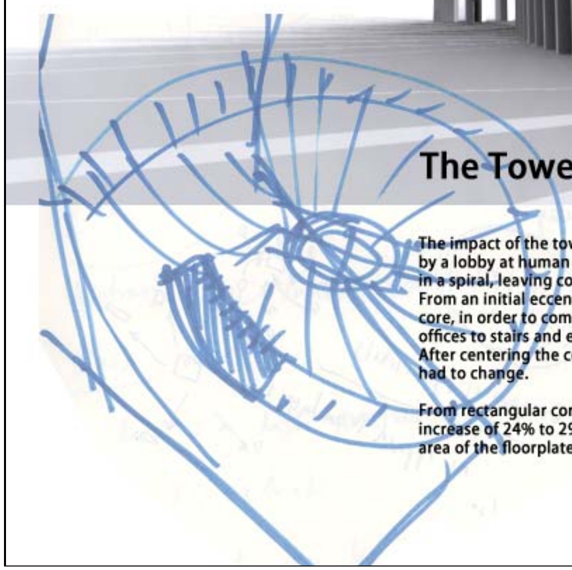


Floorplan Area : 24 039 sq ft
Core Area : 6 849 sq ft
Maximum Core-Facade distance : 36 ft



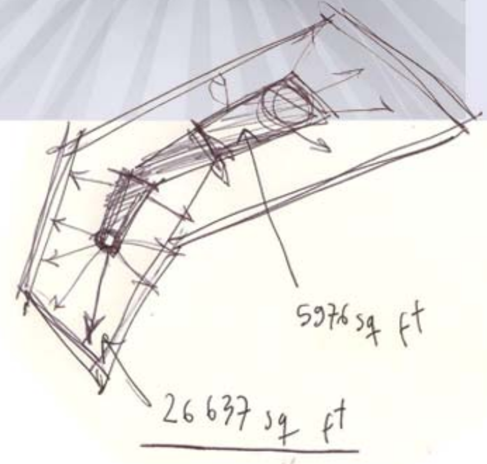


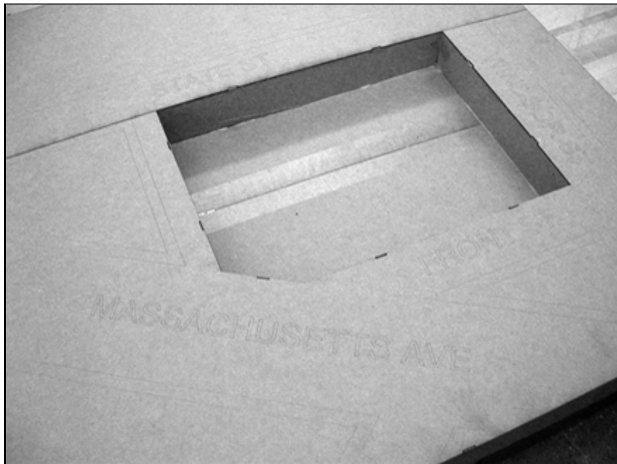
The Tower

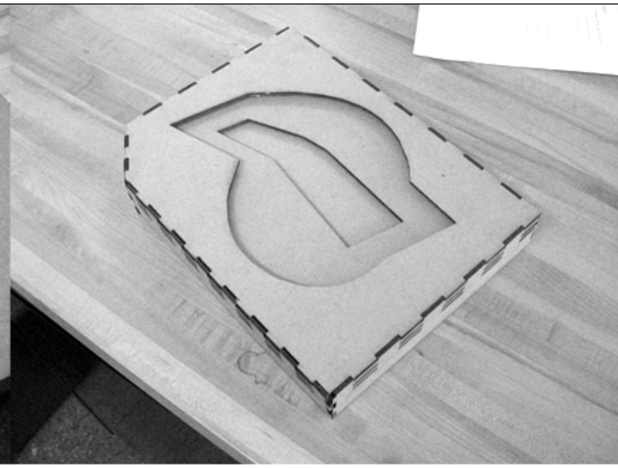


The impact of the tower on the street level is diminished by a lobby at human scale. The lobby receives the visitor in a spiral, leaving considerable space on the sidewalk.
From an initial eccentric core the design evolved to a dual core, in order to comply with the required distances from offices to stairs and elevators.
After centering the core, the rectangular shape of it also had to change.

From rectangular core to ireegular core implied an increase of 24% to 29% of the core relative to the total area of the floorplate.



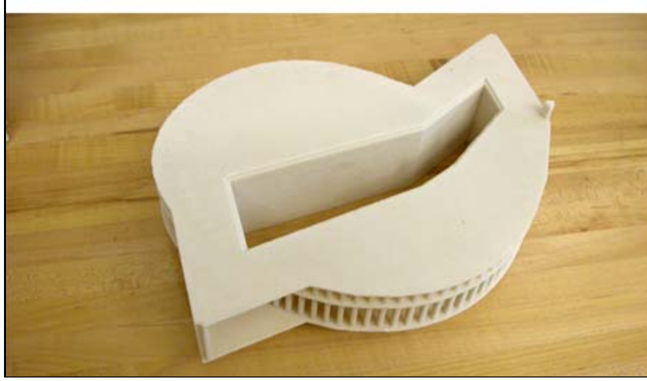


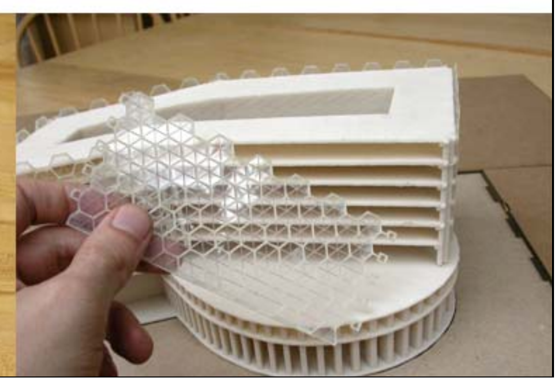


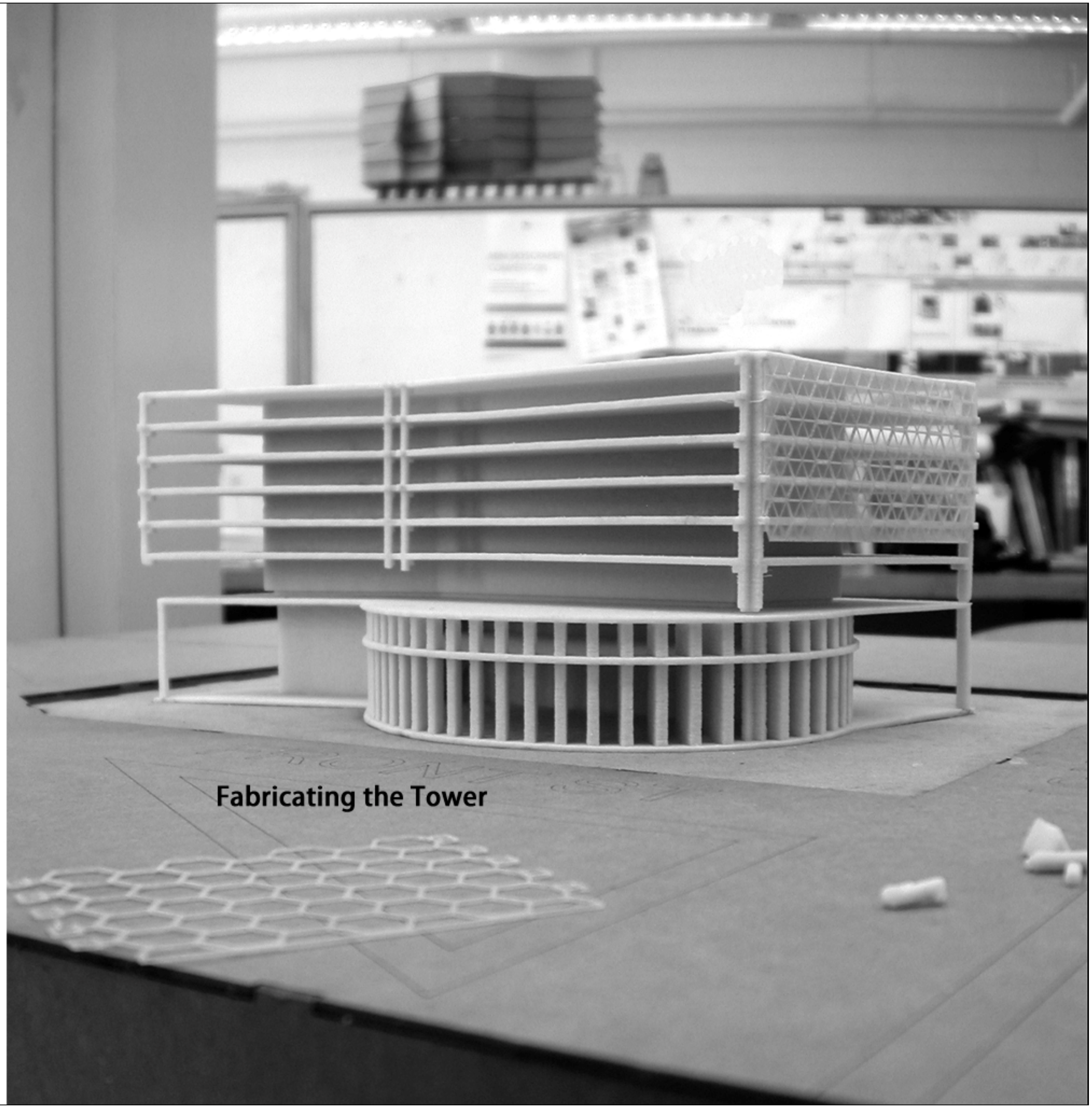
The base was lasercut in 1/8 chipboard, the lobby and the floorplates and columns were two separate ZCorp Prints.

The facades are two superimposed layers of lasercut acetate. These were attachedto the ZCorp prints by means of a notching system.

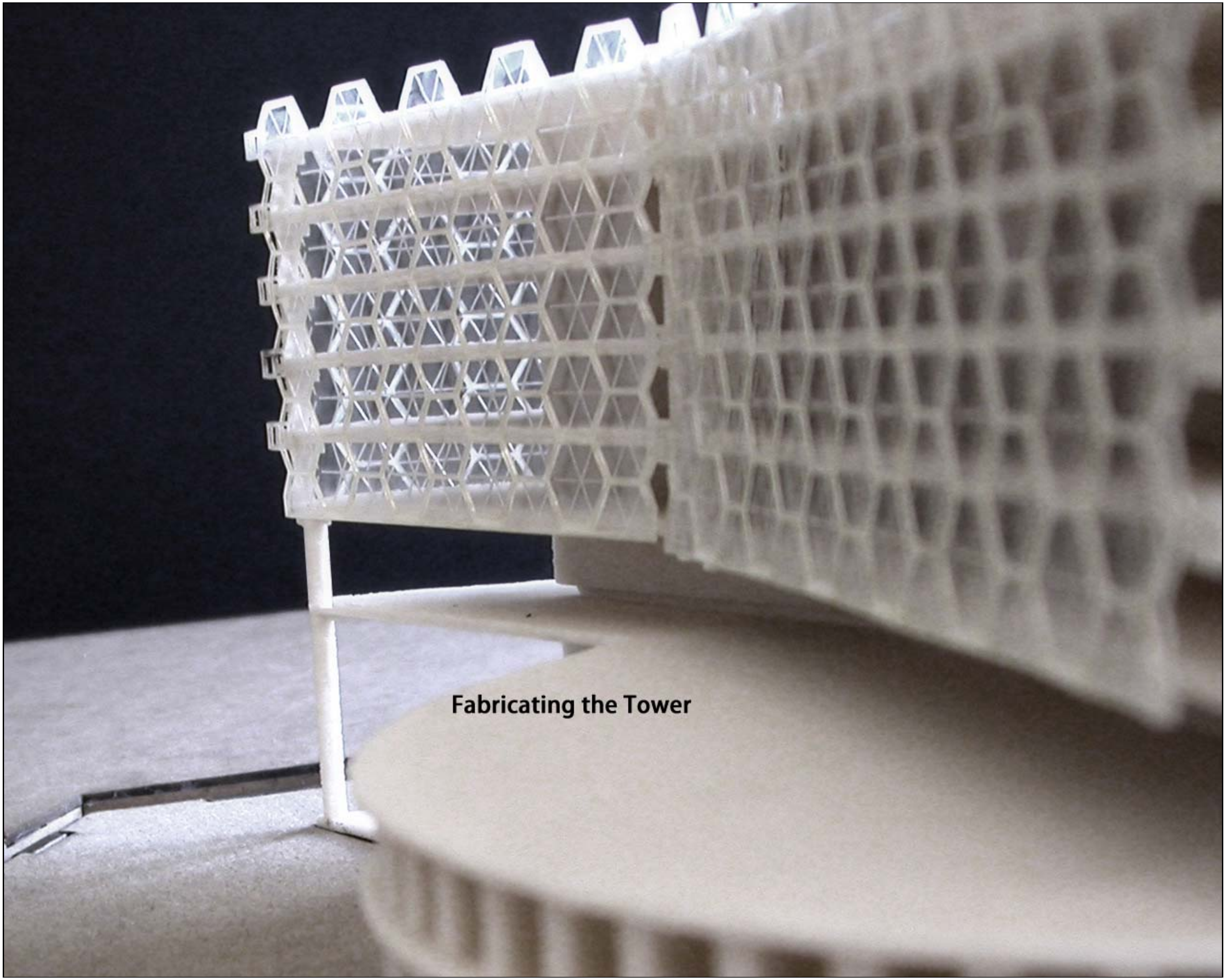
Fabricating the Tower

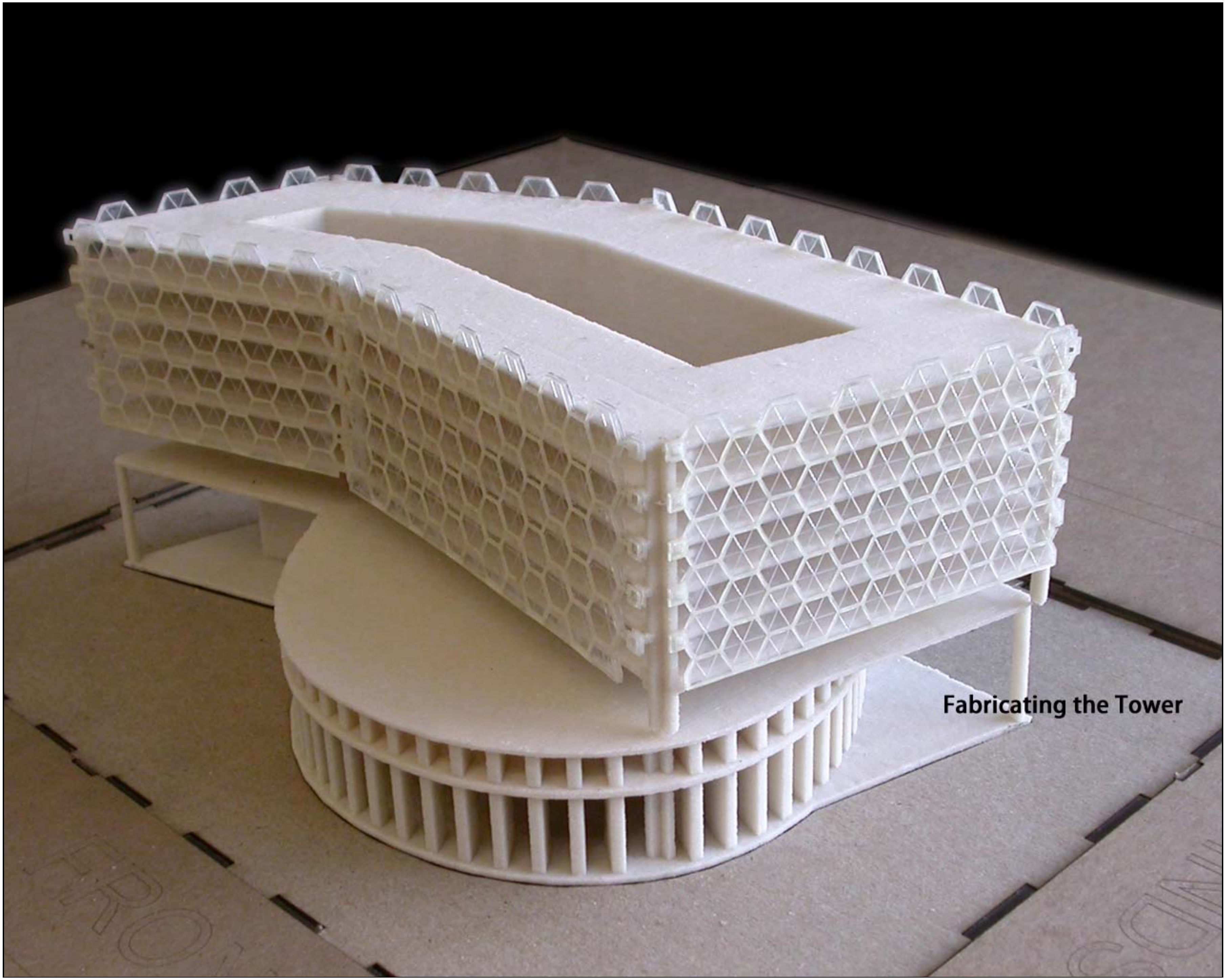






Fabricating the Tower


Fabricating the Tower



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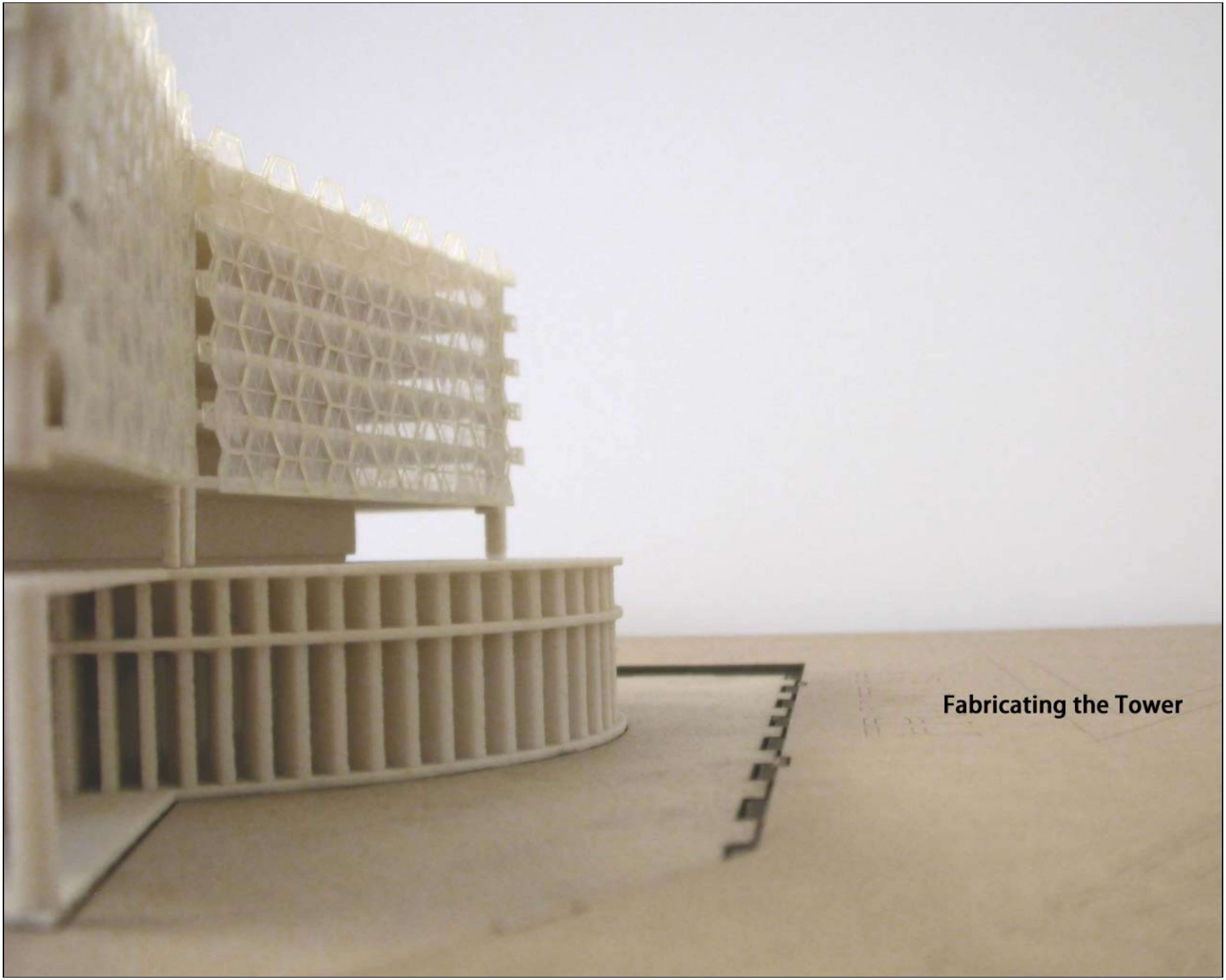

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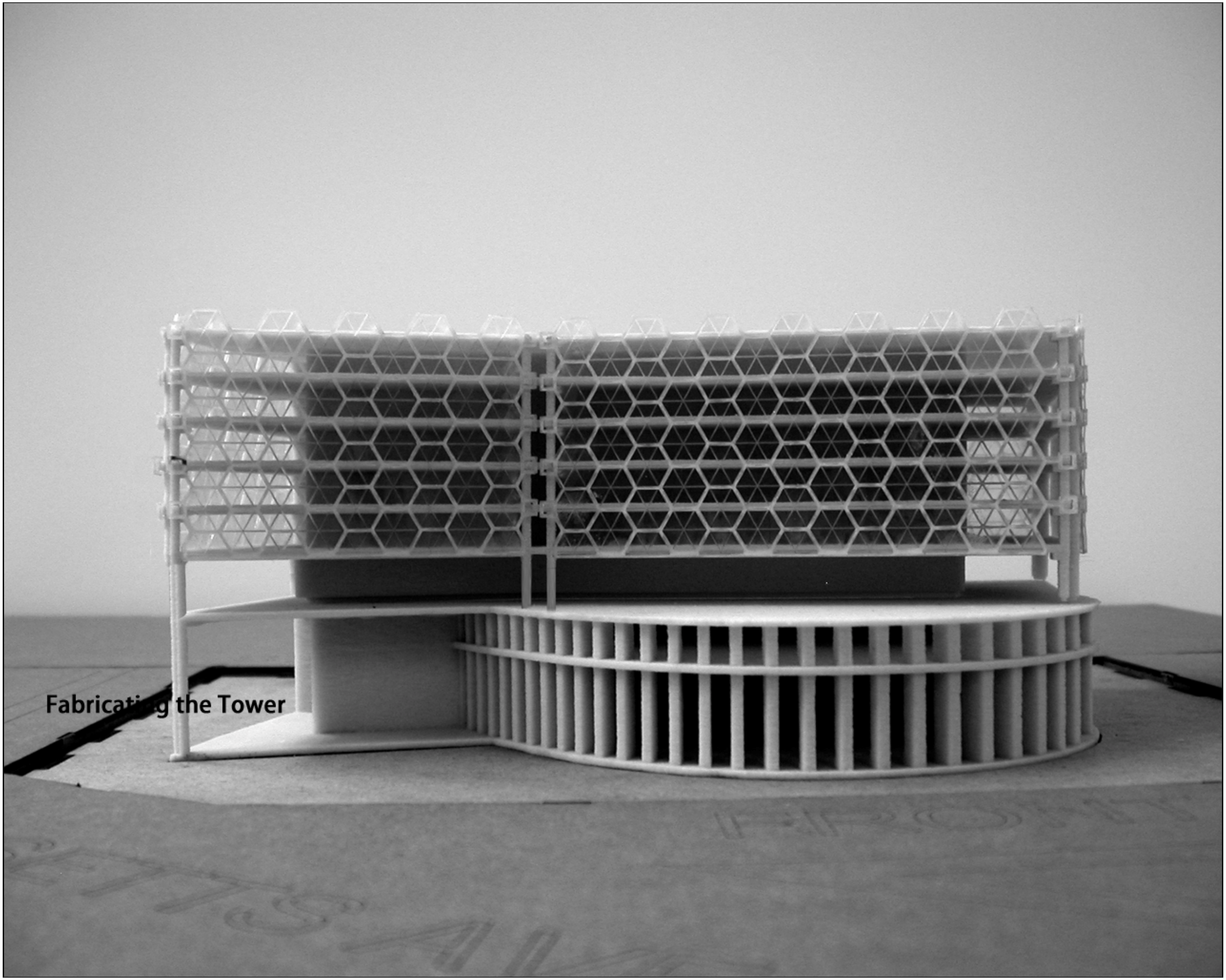

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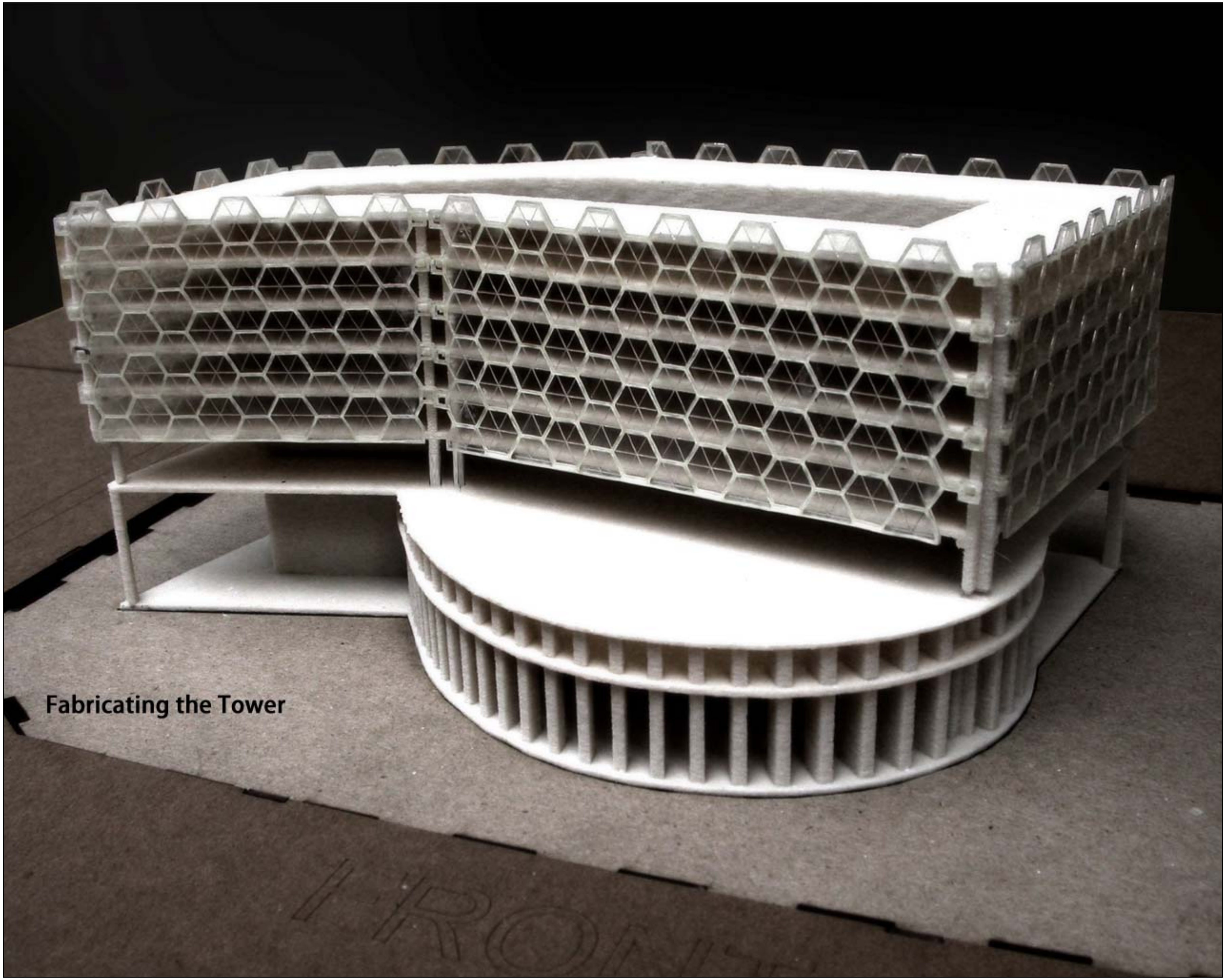

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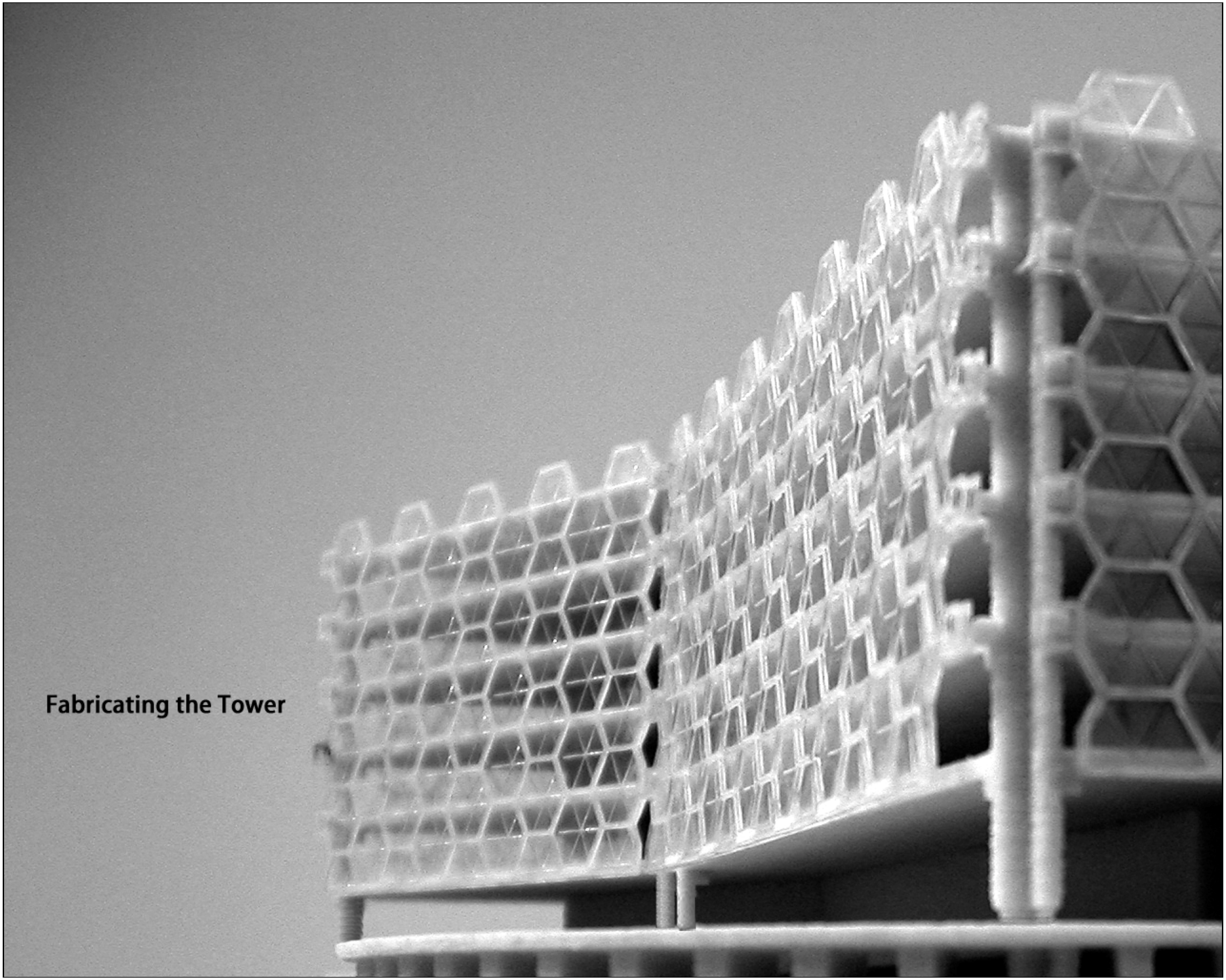
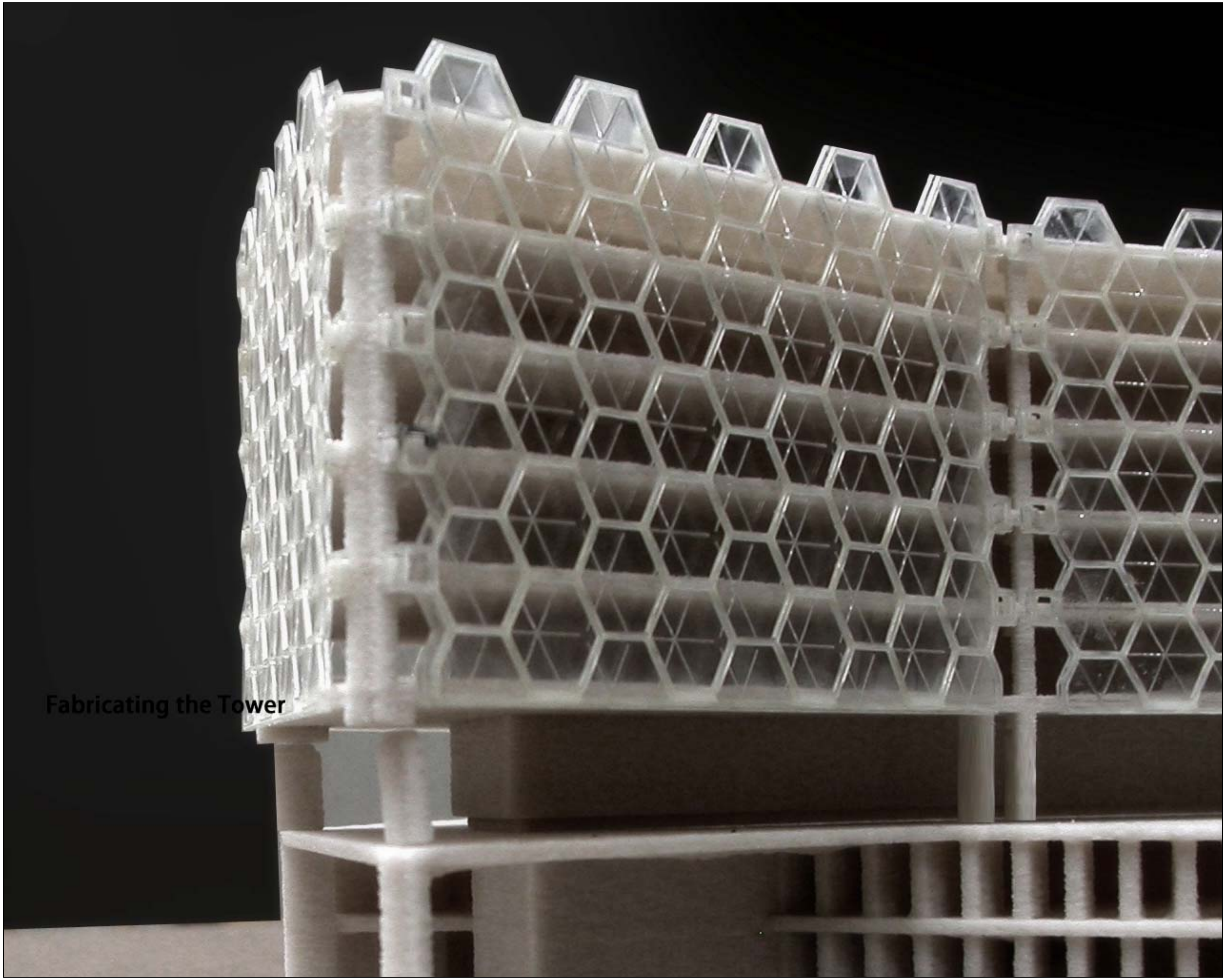

Fabricating the Tower


Fabricating the Tower

Thank You