

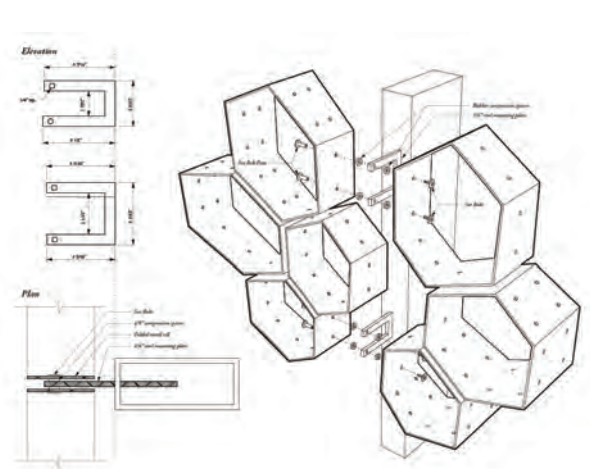
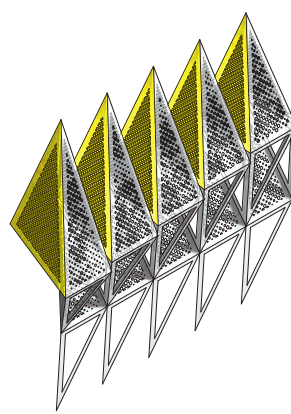
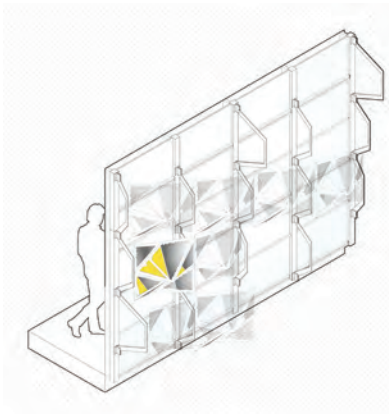
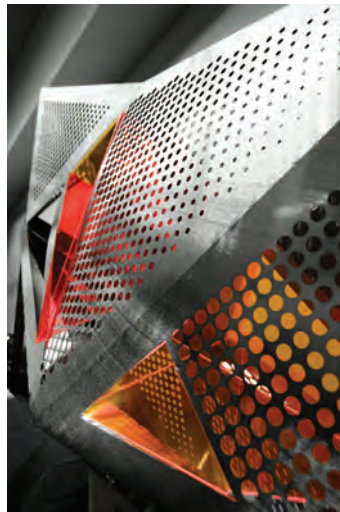
Surface, Screen & Structure

ARCH A4781

Tech Elective Fall 2015 // Tuesday, 7-9 PM // Room 115
Professor: Joseph Vidich: jwv2102@columbia.edu

COURSE THESIS:

This course focuses on the design and digital fabrication of full-scale prototype sun screening systems. Primarily an applique, the screens will perform as ornamental expression and functional shading. Students will design thoughtful solutions that are graphic and spatial while creatively resolving light transmittance and structural requirements. At the building scale, the screen systems will be designed, iterated and optimized using Rhino. At the scale of the panels and connection details, the full-scale prototype will be designed and fabricated using Solidworks, a parametric sheet metal modeling software. Prototypes will be made from 22 gauge stainless steel sheet. The prototypes will be constrained by their physical properties (thermal expansion, machine limitations, light transmittance requirements and assembly requirements) requiring students to design with such realities in mind. Students will work in teams of 3 or 4 and will be provided all the structural details and 3D models of the Adidas Sport store facade in order to expedite the prototype design process.



DIGITAL FABRICATION + PROTOTYPE:

The digital fabrication will be done with Maloya Laser and their 4000 watt laser cutter and with GSAPP's fabrication lab. Students will have the opportunity to learn and work directly with Maloya Laser's President, Reto Hug, and CAD/CAM fabrication experts. In addition, throughout the semester students will meet with and discuss their design strategies with licensed structural engineers, lighting designers and facade system designer and manufacturers.

The prototype, literally a 3D sketch, allows for an unparalleled opportunity to experiment, learn and modify. It emphasizes a circular rather than linear process, informing the digital design which in turn will inform future prototype iterations. Each prototype will be tested for material, tectonic and design failures, combining hands-on learning with physical optimization. The digital model, capable of numerous simulations, will be iterated with the data received from the prototypes to advance the design and further analysis of the system as a whole. Teams will be required to design and fabricate two full-scale prototypes.

COURSE STRUCTURE:

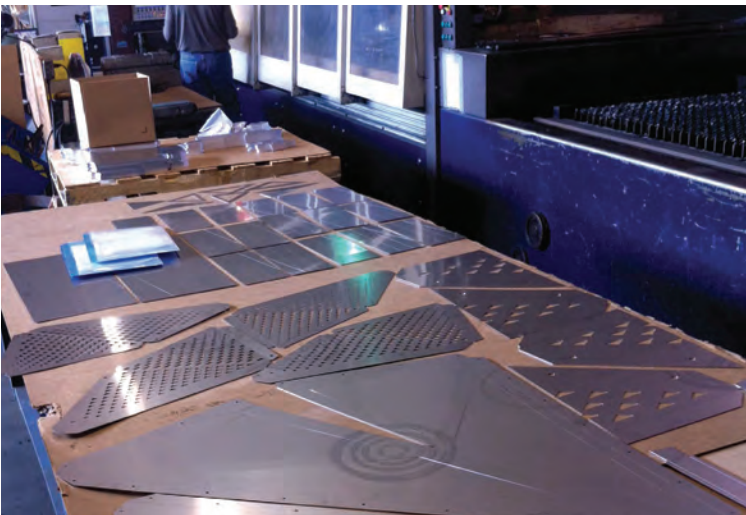
1. Utilize Rhino as generative modeling tools in order to design a screening system that is responsive to the material capabilities of metal, natural and artificial light transmittance and CNC machine techniques
2. Review design work with a structural engineer, to analyze the forces that will act globally upon your cladding system as well as locally at each joint or connection
3. Use Solidworks to create an accurate parametric model, materially and structurally, of a single connection detail.
4. Digitally fabricate two stainless steel prototypes using Maloya Laser and the CNC routers available at the GSAPP

COURSE DELIVERABLES: (per team)

1. Two full-scale digitally fabricated prototypes of your screening systems
2. A Technical Report at the end of the semester providing all the process, analysis, and technical data for your system

FIELD TRIPS: MALOYA LASER

- Maloya: Touring the advanced CNC machines and technologies with Reto Hug
- FACE Design + Build: Touring the structural metal working studio and design studio with Todd Fouser
- Possible site visits to see rain screen and sun screen systems in the process of installation



GUEST LECTURES:

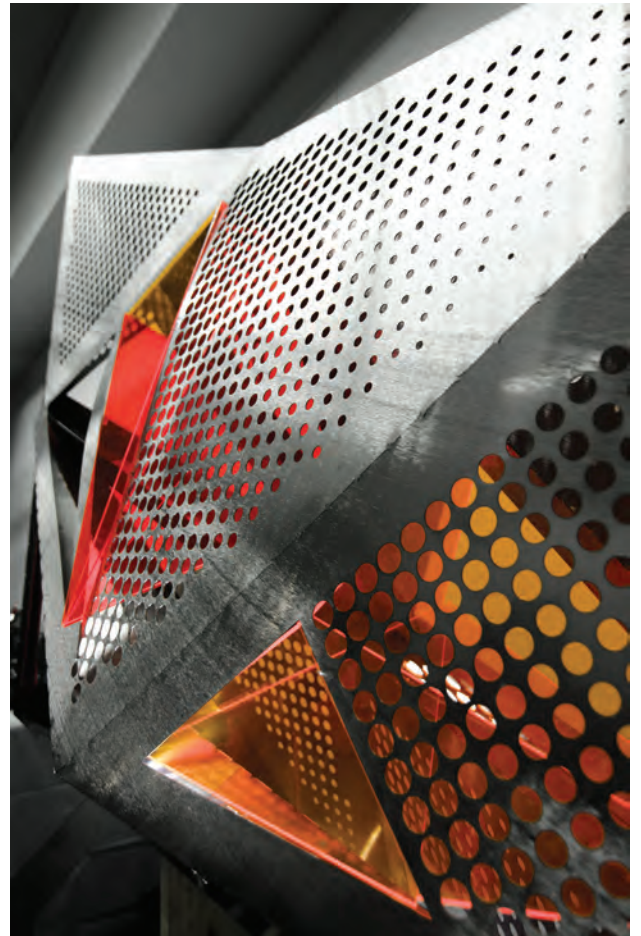
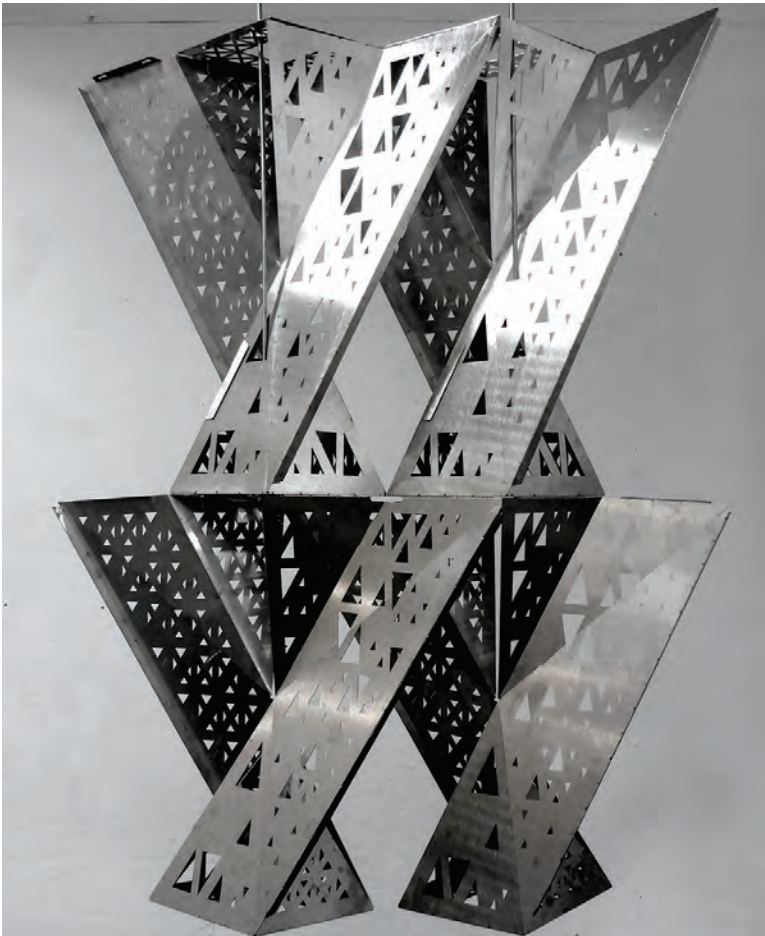
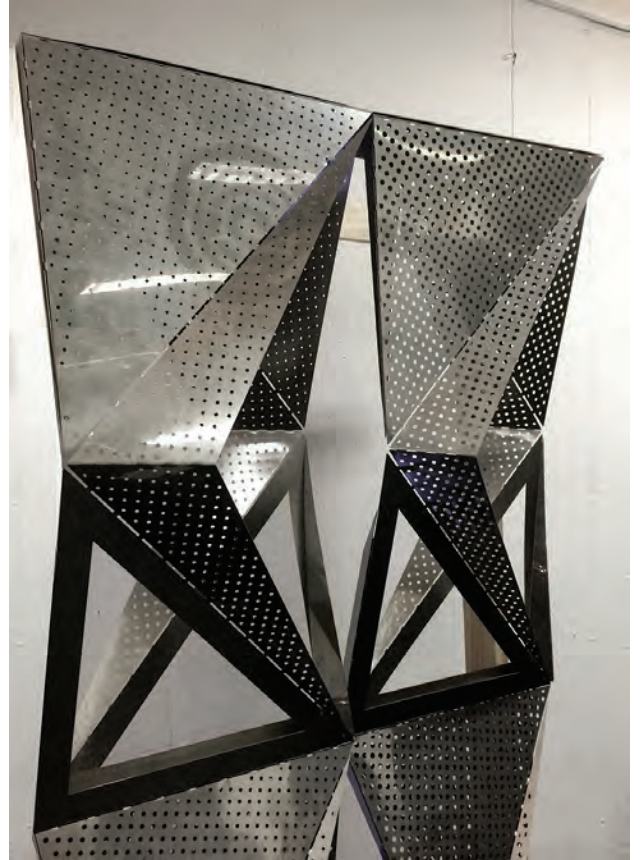
- Reto Hug: President Maloya Laser – relationships between the designer and fabricator. Optimizing for fabrication and analysis. Pricing structures and the reality of value engineering
- Structural engineer and curtain wall consultant – analysis and optimization of global and local systems (panels, armature and detail)
- Facade system manufacturer – Capabilities of the full-scale mock-up and built-up structural cladding details. Finishing techniques (black oxide patina, powder coating, galvanizing, anodizing, plating)

BIBLIOGRAPHY - OPTIONAL:

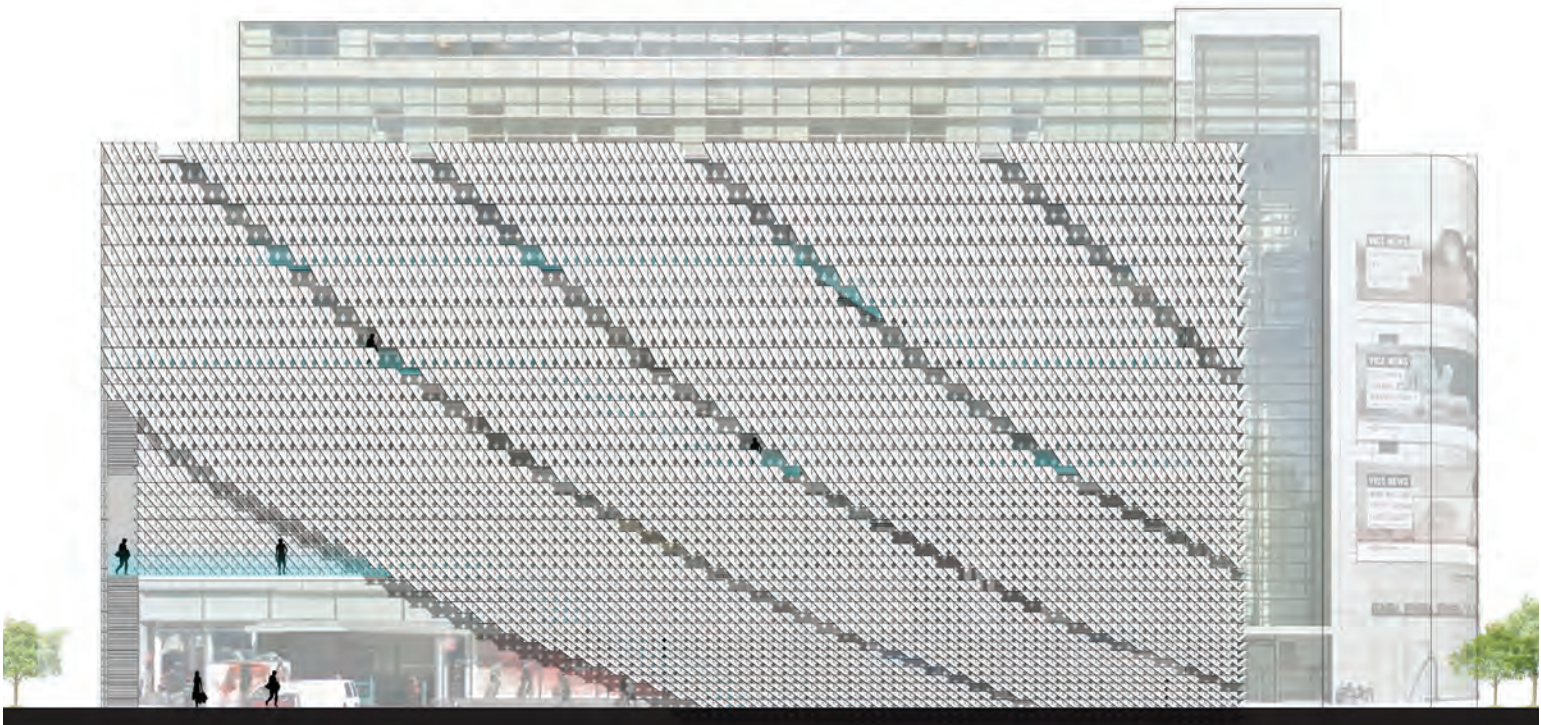
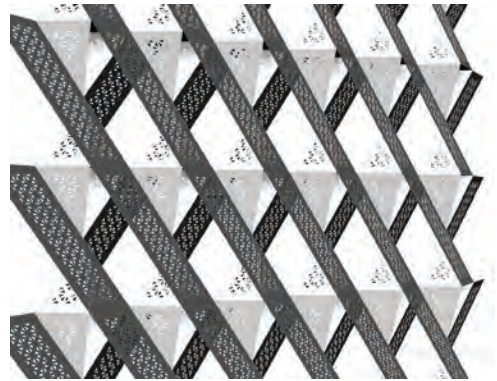
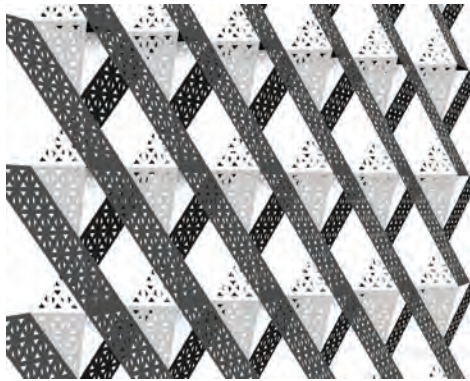
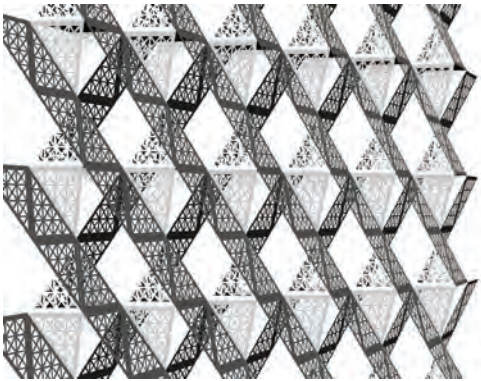
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- The Function of Form, Farshid Moussavi, Actar, Barcelona, 2009
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- Atlas of Novel Tectonics, Reiser + Umemoto, Princeton Architectural Press, 2006
- Tooling, Pamphlet Architecture 27, Aranda/Lasch, Princeton Architectural Press, 2006
- Pye, David, The Nature and Art of Workmanship, Herbert Press, London, 1995
- Pye, David, The Nature and Aesthetics of Design, Herbert Press, London, 1978
- Architecture in the Digital Age: Design and Manufacturing, ed. Branko Kolarevic, Taylor & Francis, New York, 2003
- Refabricating Architecture, Stephen Kieran + James Timberlake, McGraw-Hill, 2004

SELECTED RECENT STUDENT WORK ON THE FOLLOWING PAGES

FALL 2014 // Case Study: Adidas' Sport Performance Store Facade







TOP PANELS - TREE FOLIAGE MAPPING

