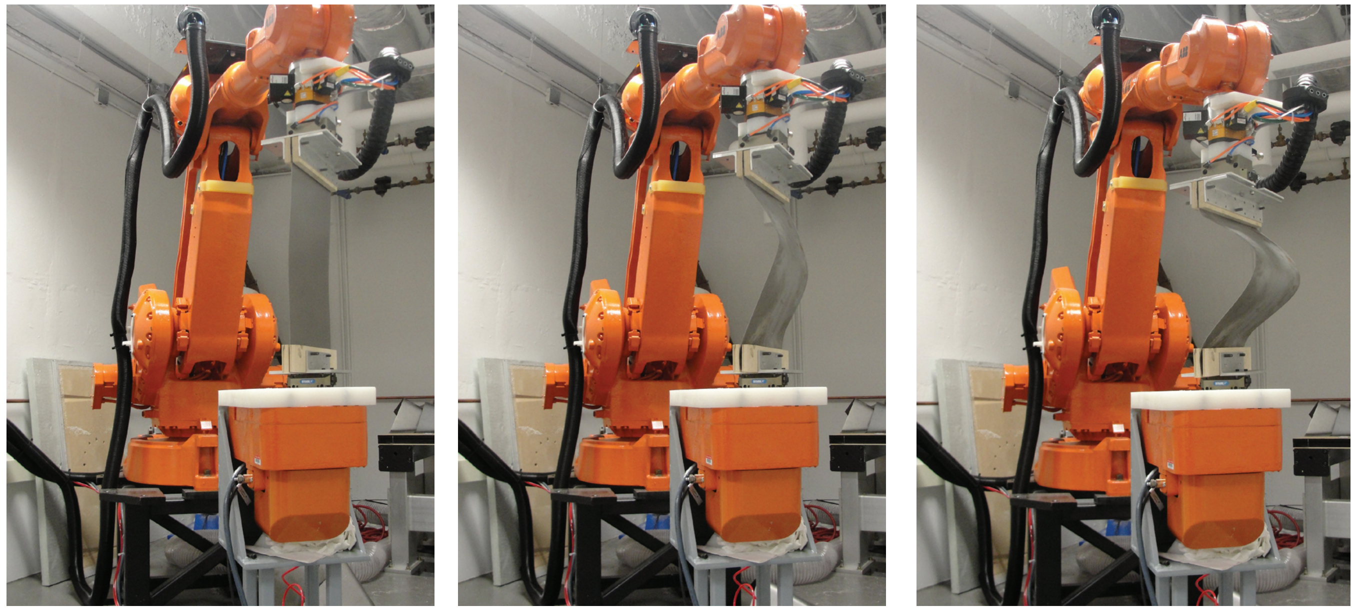
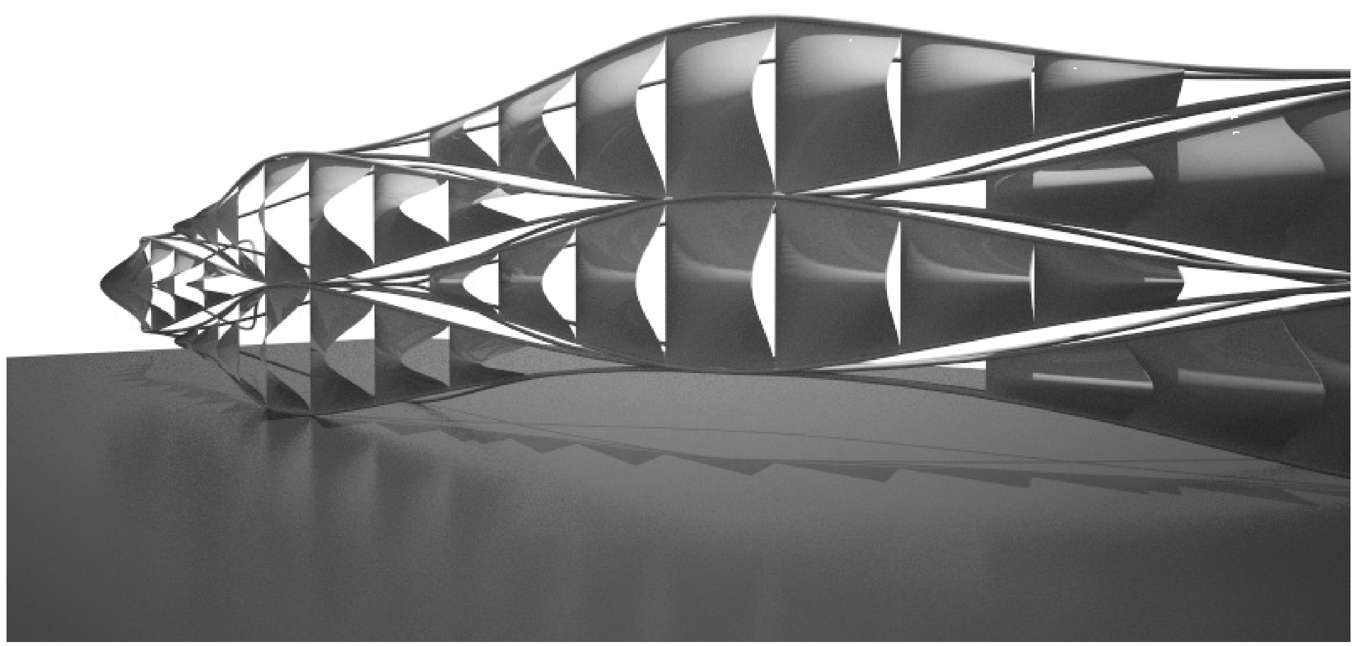
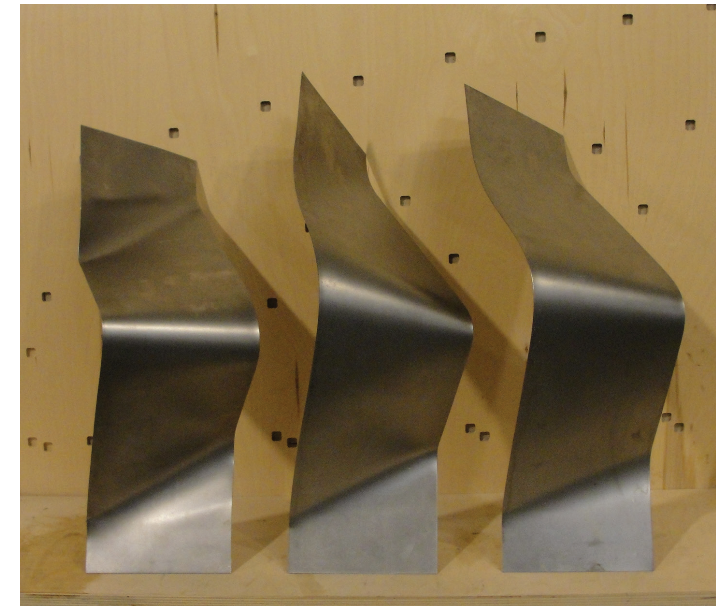
SECTION 3:

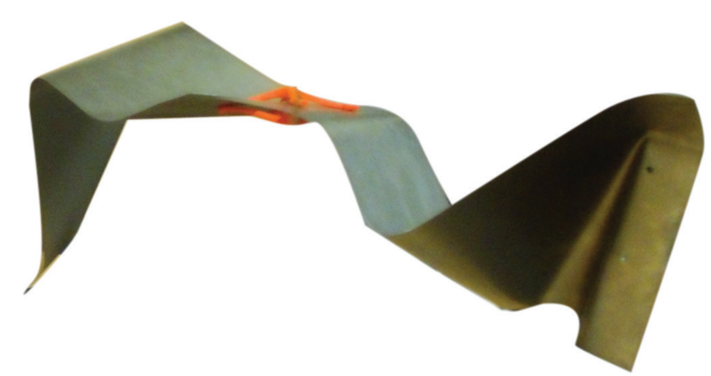
SELECTED PORTFOLIO OF STUDENT WORK
CARNEGIE MELLON UNIVERSITY 2007 - 2011
(reverse chronological order)







Madeline Gannon, Shawn Sims

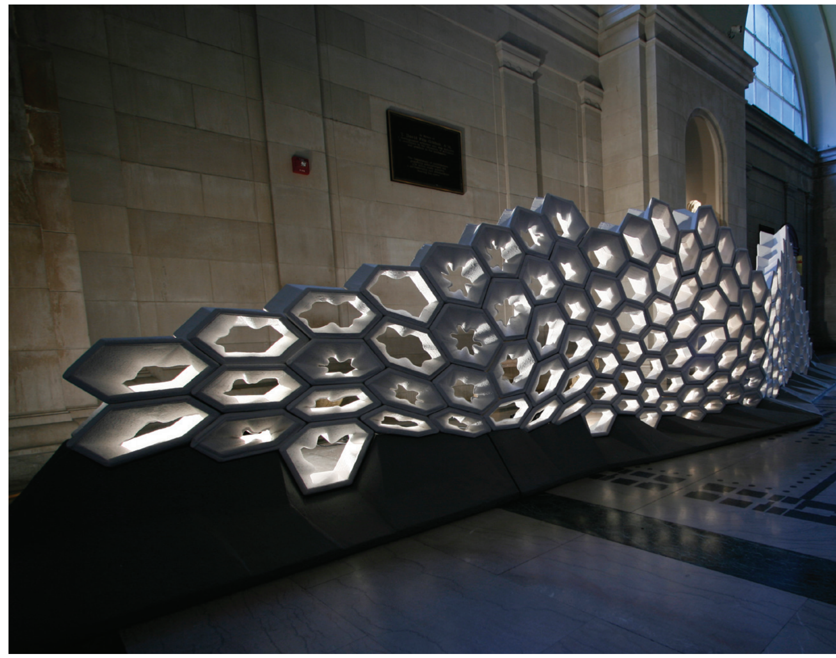


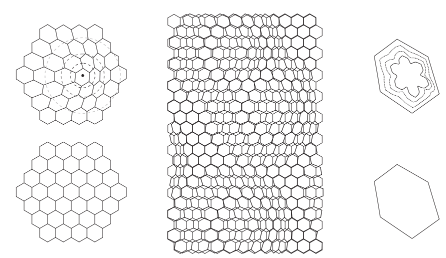
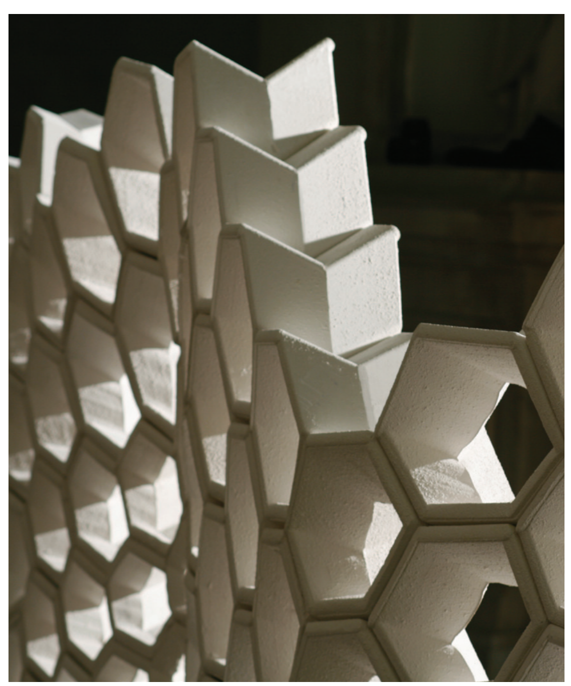
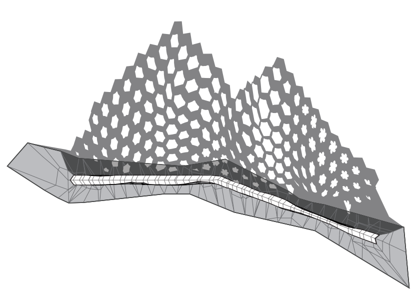
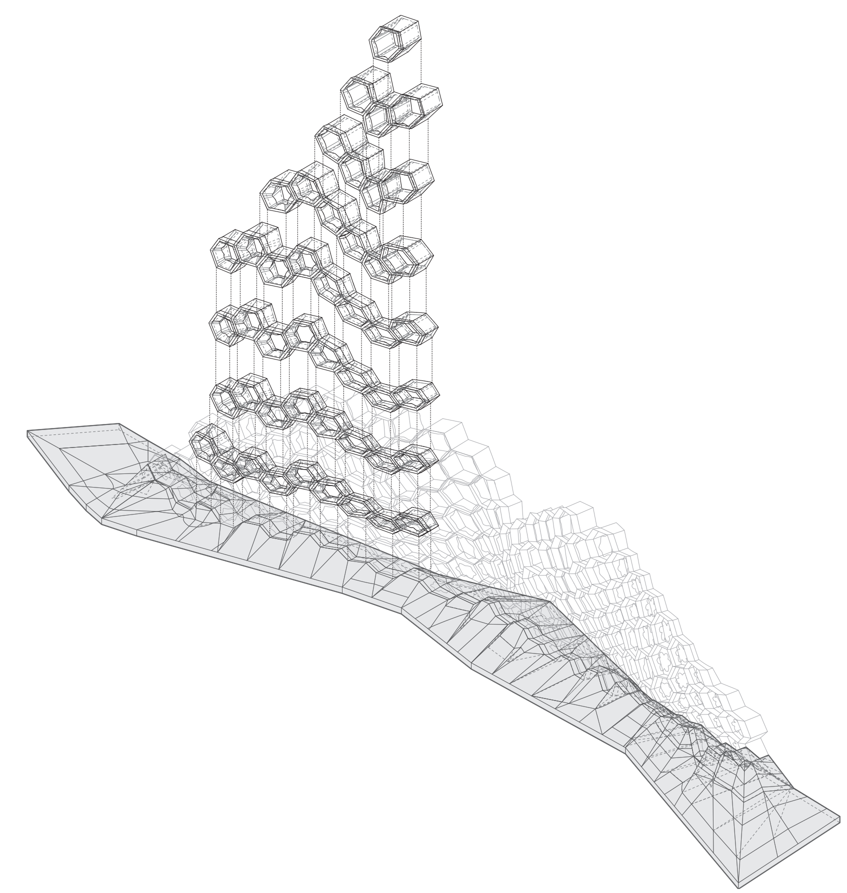
DEFORMATIVE PROCESSES IN ROBOTIC FABRICATION

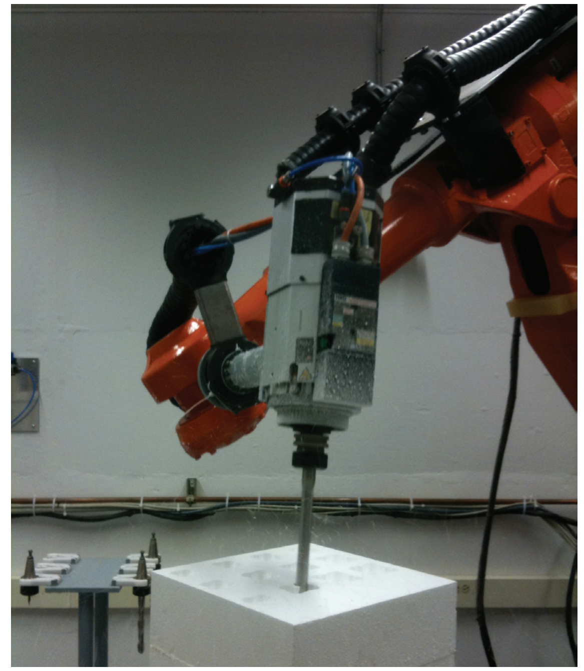
This ongoing research, Systematic Transformations, builds upon, yet distinguishes itself from a growing body of additive and subtractive robotic fabrication design research by exploring methods of nimble, highly customizable methods of material deformation. It examines the relationship between material processes, material performance, and robotic fabrication in architecture, to propose methods in digital fabrication that are directly informed (in real-time) by material performance through transformative fabrication processes. As such, this research seeks to utilize industrial robotics to offer feedback mechanisms for digital fabrication to enrich design processes, breaking the typical linear work-flow of architects and designers.

This research seeks to leverage the strength and positioning precision of the robot through sheet metal bending processes to produce three-dimensional ruled surfaces without the use of jigs or molds typically found in existing methods of metal fabrication. Specifically it seeks to do so with a high degree of surface fidelity, geometric accuracy and formal certainty. The process utilizes the robot to translate the x,y,z,i,j,k position of one end of the sheet while the position of the other end remains fixed. The application of these forces upon the cold rolled steel sheet make the material fail in such a way that it reveals an optimized structural form. These procedures offer a unique approach to the aggregation of panels in order to address a larger geometric agenda that would otherwise be impossible. A particular area of focus has been the contrast between precise digital methods and material behaviour, specifically the compensation of material memory and elasticity through over-compensated robot motion. This "translation" between desired bend and necessary bend results a subtle yet critical distinction between virtual form and physical implementation.

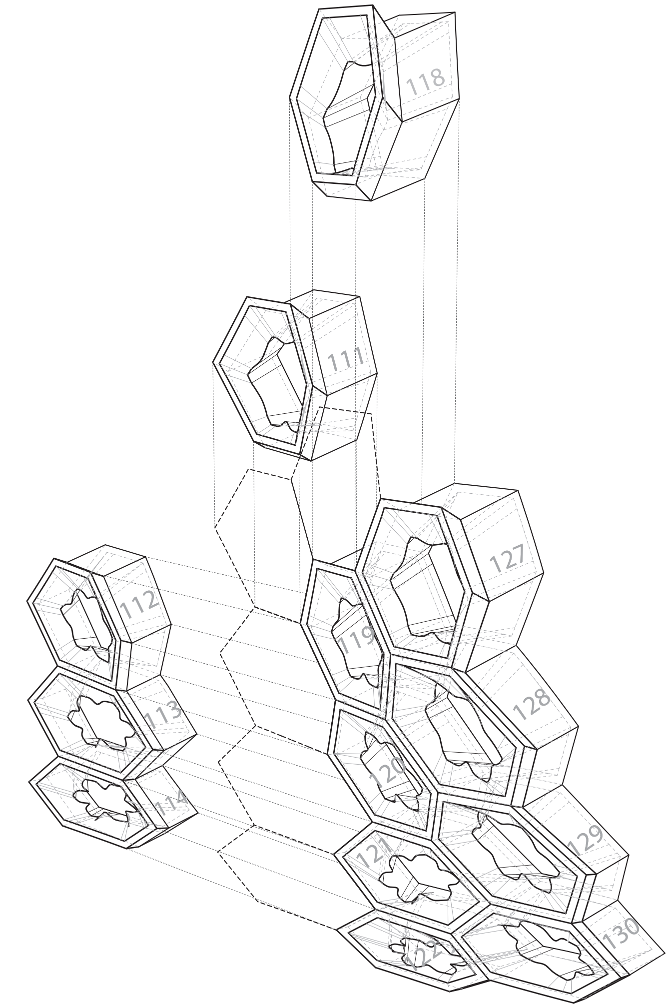
It is this very information that provides digital design with new feedback data that can enrich modeling and process engineering. Information such as elasticity, strength, and actual form vs designed form are variables that are currently absent from the front end of the design process. While there may be a knowledge base of material physics, the fundamental need for quantitative data able to be leveraged prior to fabrication is necessary. The aim of Systematic Transformations is not only a fabrication project but an attempt to augment the typical design process and integration of data gained post-design.

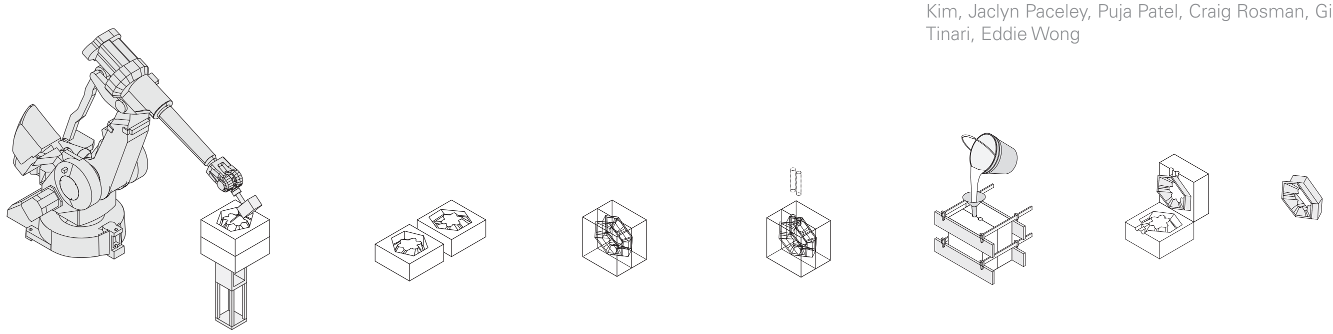


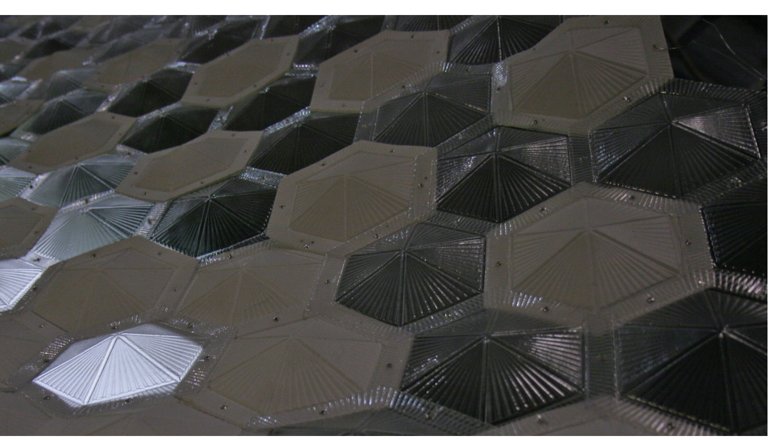


Arthur Azoulai, Jaeeun Chung, Nelly Dacic, Jared Friedman, Chris Gallot, Spencer Gregson, Matthew Huber, Patrick Kim, Jaclyn Paceley, Puja Patel, Craig Rosman, Giacomo Tinari, Eddie Wong

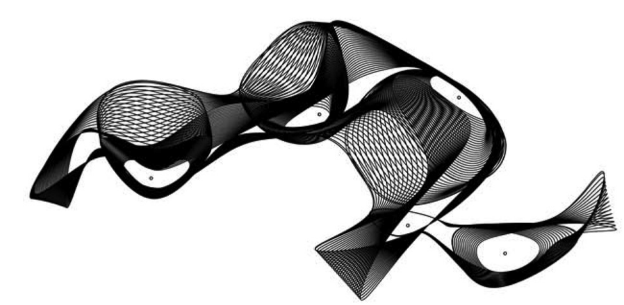




Karen Branick, Silvia Park, Kevin Wong



Max Arocena, Conor Doyle, Samuel Kriegler

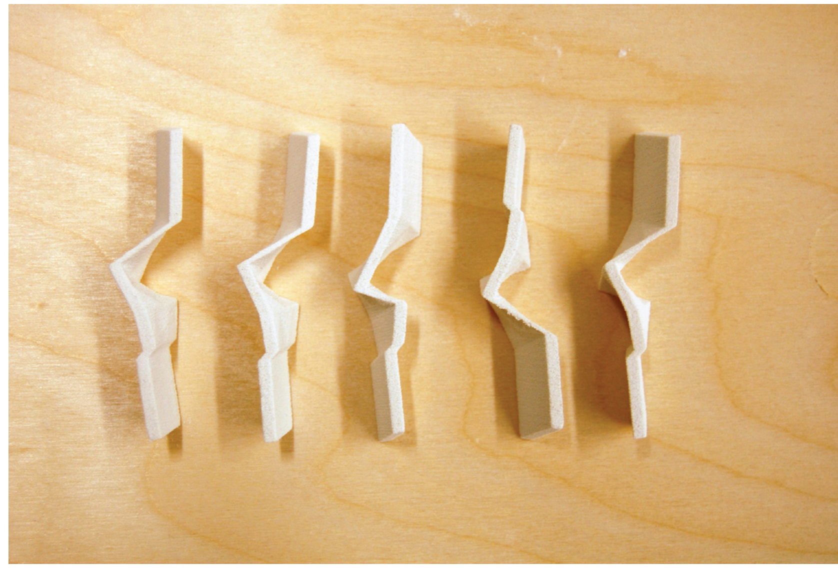


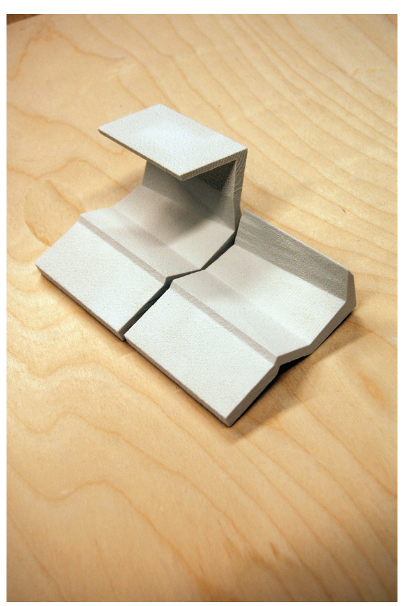
COMPONENT SURFACE

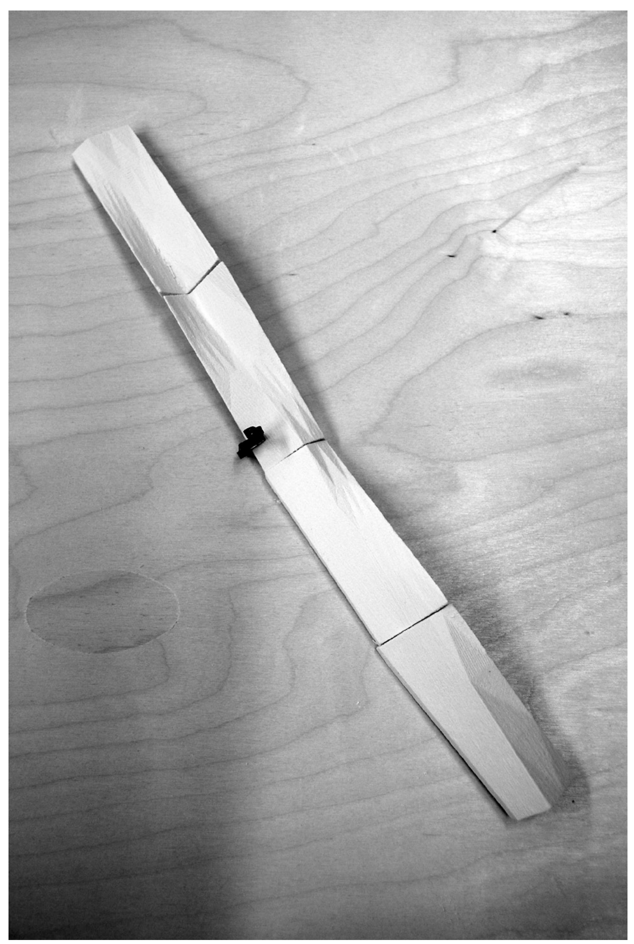
Charge
Develop a reconfigurable porous surface comprised of 4 distinct, yet interrelated components. These components must be capable of abutting in such a way as to preserve surface area across the seam. The surface must be capable of resting horizontally.

Limits
All pieces should be understood as monolithic precast concrete and must not weigh more than 1000lbs each (concrete weighs approx. 150lbs per cubic foot).

Production
As a rapid prototyping project, final output will be 3d printed models in either plaster or plastic. Given the integration with landform, the proposed system must always be communicated with topography in mind.

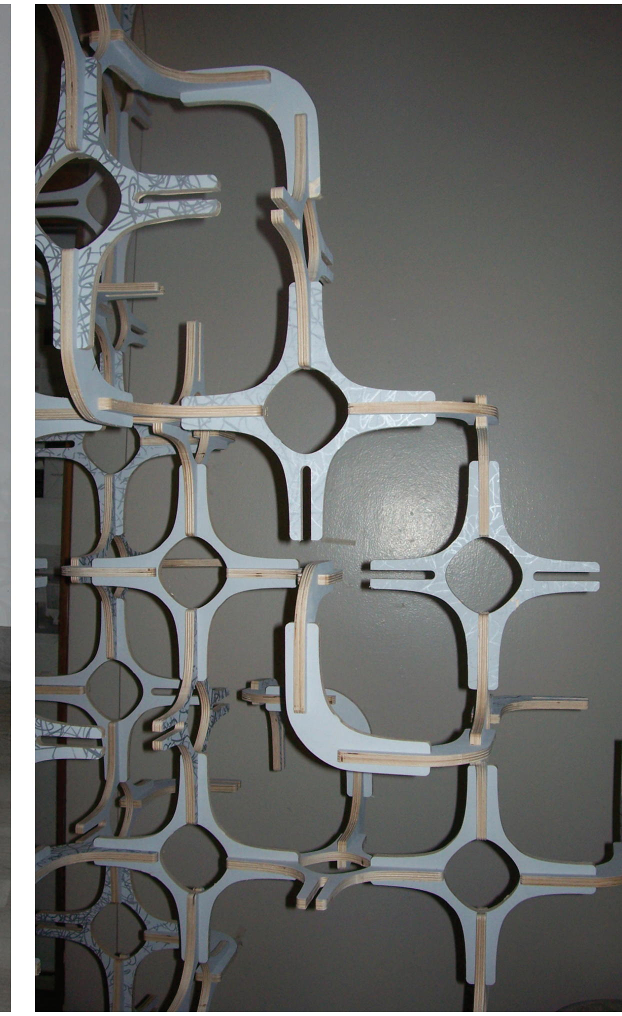




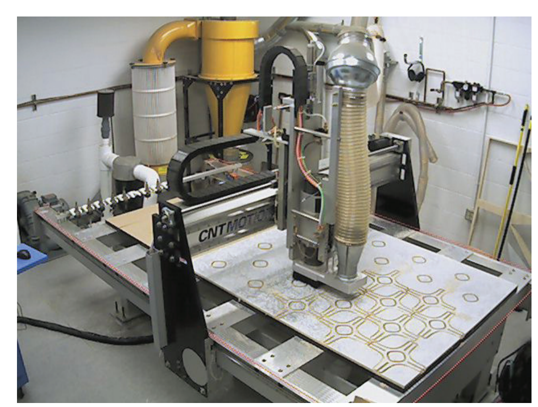


Niko Triulzi, Page Warman

Arthur Azoulai, Yifei Lu, Mitsuhiro Matsurra, Diego Taccioli



Nelly Dacic, Yarden Harari, Nilam Patel, Misha Varshavsky



OPEN SYSTEM

Charge
Develop a series of reconfigurable interlocking plywood components that when joined produce a self-supporting screen of maximum verticality.

Limits
Each team will have (6) sheets of 4'x5' ½" plywood for both testing and final production.
No glue or mechanical fasteners.
There shall be at least (2) different pieces to the assembly.