Sartorial Tectonics: Installation for The Hyde

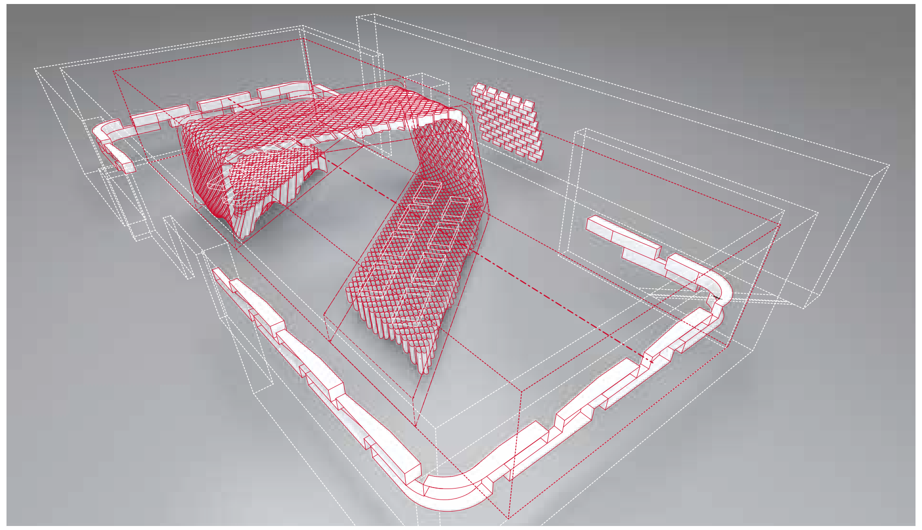
Andrew Saunders
Rensselaer Polytechnic Institute

The installation for The Hyde Collection provided an opportunity to explore the integration of pliable material tectonics, computation and digital fabrication techniques to curate the exhibition through sensorial affects. The installation is composed of 1,224 folded, developable surfaces, digitally-generated and fabricated from sheets of translucent high-density polyethylene. The effects of luminosity, translucency, and weightlessness produce an immersive environment that influences viewing and movement through the gallery while dividing, uniting and exhibiting the work.

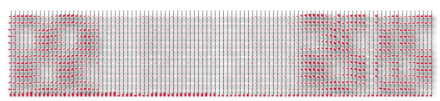
Sartorial Techniques. The construction of developable surfaces allows a surface to be unrolled onto a plane without distortion. These mathematical principals are used to turn flat fabric into complex three-dimensional formations.These operations are diagrammed using patterns that anticipate operations of folding, bending, rolling, cutting and stitching.

HDPE. The gradient geometry used in the assemblage needed to maintain translucency and be rigid enough to self-support and display models without opaque substrate or framing support. 1/16th inch, high-density polyethylene (HDPE) was chosen due to its natural translucency, bending tolerance and relative rigidity when folded. Consideration was given to material cost and weight as numerous nesting simulations were conducted to achieve the most efficiency with the least amount of waste. The parametric modeling and unrolling of the assemblage allowed iterative nesting of various sizes and quantities of modules. Other factors including maximum depth and assembly sequence were also considered.

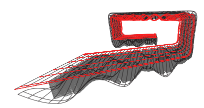
Digital Unrolling. In anticipation of unrolling these surfaces, physical mock-ups were produced to measure material elasticity of the HDPE. These measurements were parameterized in the digital model. Curves and points marking exact three-dimensional locations in the model for labeling, tabbing, intersecting slots and rivet holes were also unrolled into the surface templates. Once CNC milled, each unrolled surface contained the exact instruction for rolling, tabbing and alignment to adjacent modules. No additional drawings were needed to describe the local or global configuration.



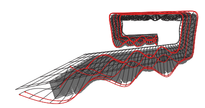
Installation components



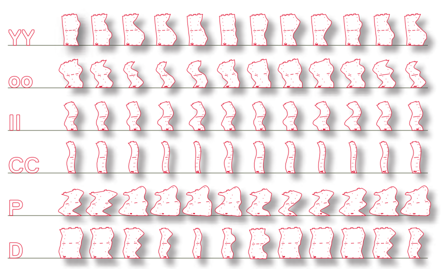
1,224 Unfolded developable surfaces



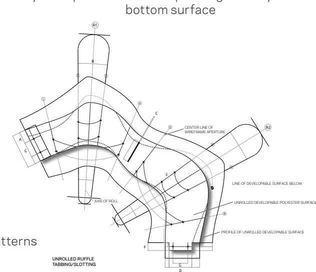
Surface profile geometry for top surface



Surface profile geometry for bottom surface



Surface profile morphology



Typical tailoring patterns

Calibrating Affects. At the global scale, the assemblage was conceived as a continuous roulette manifold. It transitioned seamlessly from display platform to translucent partition wall to directional corridor to canopy to total spatial envelope - a gallery within a gallery. At the local level, the calibration of the folded motif adapted to each localized condition. In areas where the assemblage touched the ground and operated as a display table the upper profile of the surface was aligned to create a flat display surface. The bottom side of the surface was shaped by a large sinusoidal frequency to strategically eliminate pockets of volume for less material use while maintaining a structural stability. Simultaneously, this varied the depth and translucency of the base profile.

When vertical and operating as partition, the profiles of the module were aligned obliquely to prevent direct visual porosity. As a canopy, the surface depth was modulated by two smaller nested sinusoidal profiles running at different frequencies. This served to intentionally blur a definitive reading as one continuous profile and to amplify the gradient lighting affects.

Digital Tailor. The origins of aesthetics and computation can be traced back to the creation of textiles. Through this project, digital design and fabrication allowed not only the automation of repetition but more importantly it facilitated greater control and calibration over the differences in repetition. This agility afforded by the digital to manipulate information is not unlike the pliability of manipulating textiles. The integration of these pliable material techniques with digital fabrication techniques opens up new possibilities for supple material affects that resist operating as pliable or rigid but somewhere between.