# Aortic Arc - Student Lounge Canopy

**Mark Donohue**
California College of the Arts

*Need:*
Student polls at an art and design college yielded a specific request to create a focal point for student life on campus. A series of workshops with students determined what was needed was a flexible space that could be both a setting for large group meetings as well as a place for individual relaxation. The seemingly contradictory need for a space that could accommodate large gatherings as well as downtime for individuals was compounded when an existing two-story atrium space was chosen as the site for this new student lounge.

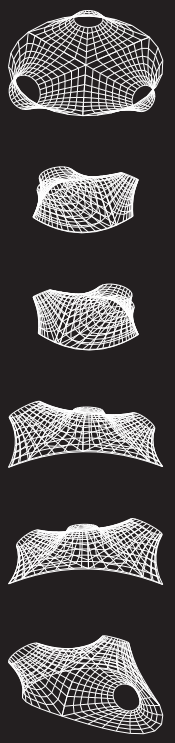
*Problem:*
The first floor was surrounded on three sides with walls that needed to continue to function as a gallery for exhibits of undergraduate work. The second floor was ringed with circulation and studio spaces that overlook the gallery space below. The problem with the existing atrium was that it was more of a place to walk through than a place to feel comfortable sitting in. People could peer down into the space from above as they walked by giving the people below the uncomfortable sense of being watched. The first floor gathering area had neither a sense of definition for large group activities, nor a sense of protection and intimacy for individual relaxation. A visual connection was still desired between the two floors but a degree of control would be required. The two-story atrium was also topped with clearstory windows that lent a generous amount of natural light. The question became how to control the view without blocking the light.

*Solution:*
The design team developed a canopy that solves the programmatic requirements while pushing the boundary of computer modeling, structural analysis, and digital fabrication techniques. It hangs within a double-height space and functions as a light scoop, spatial definer and viewing portal.

The minimum surface structure is made up of 546 unique HDPE panels linked to one another by over 4000 pop-rivets. The name of the piece comes from its resemblance in form to a portion of the human heart and the fact that it leaps over an existing structural beam. The surface is suspended from three upper stainless steel rings (two circular, one elliptical) that are held and hold each other in tension. A singular large parabolic ring functions as a 'hoop skirt' below.

The technical and artistic challenges are unique and did not allow for a conventional approach. Collaborating closely with the designers, structural engineers employed non-linear analysis tools and parametric BIM technology to model and predict the final minimal energy form of the piece that, structurally, behaves as a hybrid between a cable-net and membrane structure.

A panelized system was developed using Generative Components and a customized Rhino script that took the raw data and turned it into a drawing file to drive a CNC milling machine that generated all the parts. HDPE plastic, the same material used to make milk jugs, was selected for the panels due to its low cost, resistance to solar degradation, recyclability, low embodied energy, and high tensile capability.



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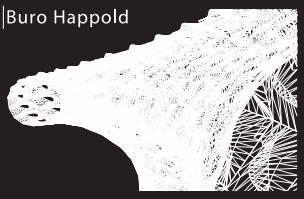
# California College of the Arts

Visible Research Office|Buro Happold



Buro Happold
Consulting Engineers

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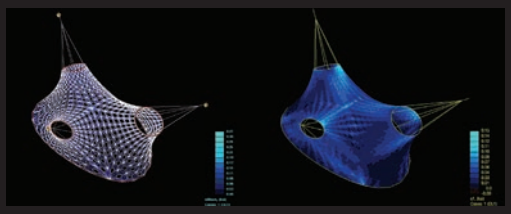

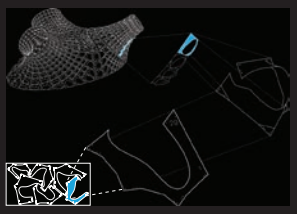

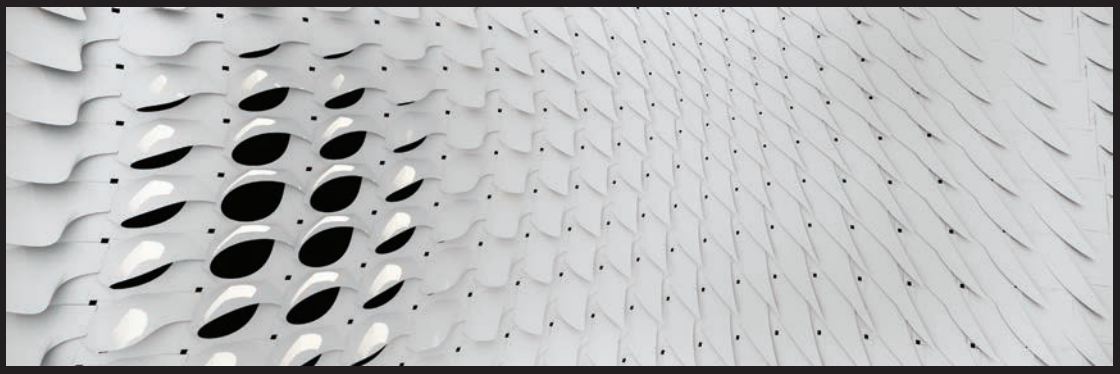

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