School of Architecture, College of Design
UNIVERSITY OF KENTUCKY
Lexington, Kentucky

Between the Drawn and the Actualized

BY GREGORY A. LUHAN, ASSISTANT PROFESSOR

Twenty years ago Chris Yessios challenged software designers to make better building design through computing. Clearly the software companies have responded to this challenge, translating the previous genre of hand-generated design into flexible generators of form and material. Advances in technology have been consistent with respect to these investigations and as power, speed, and performance increase, so has the plasticity of software. This idealistic challenge resounds in the words of Virginia Tech professor emeritus Olivio Ferrari and his challenge to his students and colleagues: "What do we do next?"

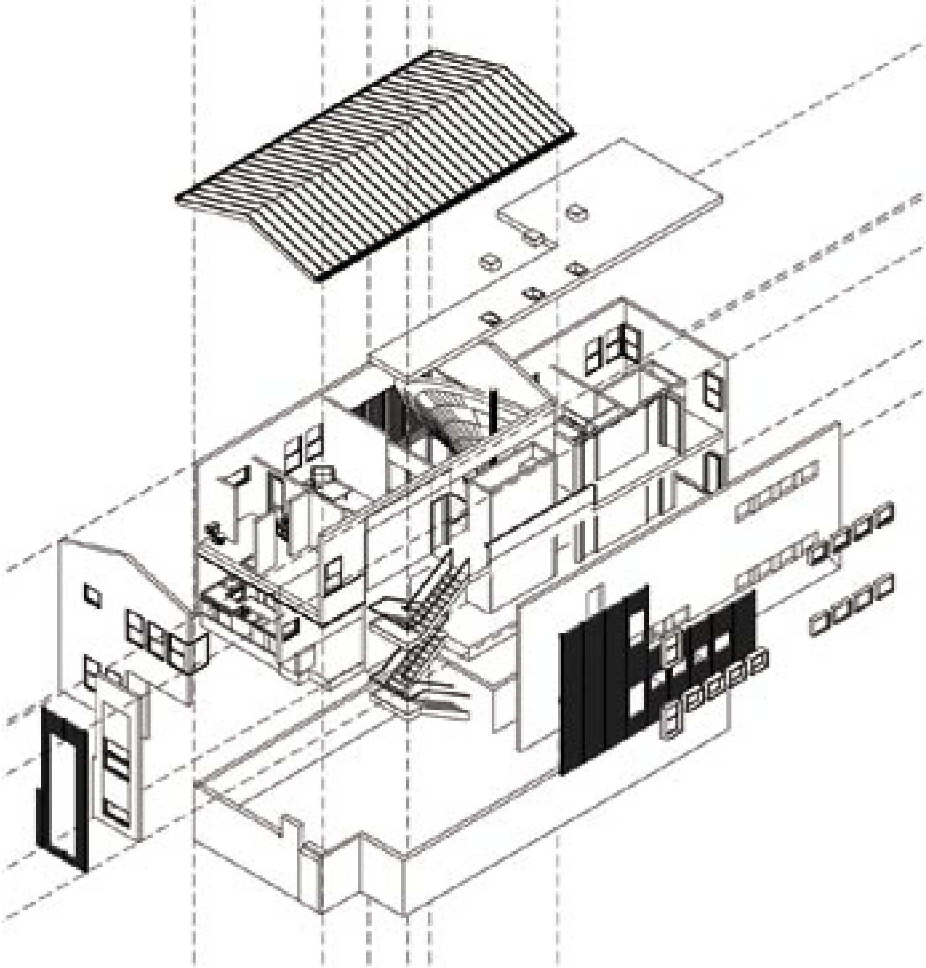
The learning processes associated with digital design and fabrication offers some insight to the future possibilities. Software designers consistently offer what I would refer to as an "intellectual speculation" on the needs of what a given profession–in this case, architecture–requires for producing work. Further to this end, architects and software companies such as auto.des.sys, Inc. and **form•Z**, have collaborated to define a fertile ground for informing the profession as compared to merely redefining the previous genre of representation or method of making. Within this collaborative context the architect generates ideas and the software designer enables them. Being able to define and refine the rules and resolutions of a design solution through parametric processes and scripting is increasingly becoming an important second language for architects today. However, even this solution resides solely in documentation and representation. And while photorealism and visualization is an important and fundamental component of most software, the essential integration that is still missing is the quality and limitations of actual (not just represented) materials.

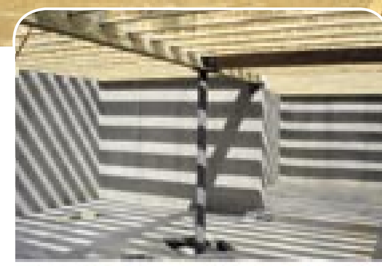
Materials properties and characteristics are not strangers to the architectural discipline. Louis Kahn's adage of asking a brick what it wants to be inherently presupposes and then challenges the designer to understand what a material can and cannot do. Literal forces need to be taken into consideration in the same way that parametric design informs the processes of making. However, the majority of software stop at visualization, as if a tangible speculation to the building's materiality and the subsequent process of its assembly was not a logical next step in the development of an actualizable architecture.

Since the early 1960's, design/build programs have increasingly become an important asset of several architectural programs throughout the United States and abroad. Within this context, I speculate that software companies should investigate meaningful design-build alternatives that augment their product line through fabricate-assembly methodologies. As an architect and professor that continually oscillates between the eighth decimal place of digital design and fabrication to the 1/8" or greater tolerance of physical construction, I have increasingly become interested in the amount of built-in play that is necessitated by the discrepancy between the digitally drawn and the built. This, of course, begs the question, how much modeling do we actually need to do in order to build a structure?

Software today seemingly responds to new materials and methods of abstraction such as stereo-lithography and laser cutting machines, however, the primary limitation of these devices is they stop at scaled-abstractions of real world forces. In order to narrow this gap, a move towards full-scale fabrication and assembly via CNC milling processes and other forms of 1:1 making offers the ability to address the lack of real-world materials that would be used in construction. However, there is a cautionary directive that is assumed by this tasking–most builders do not build this way. As such, this offers another realm for programs incorporating digital media into the design-build milieu. In addition, the traditional mindset of printing out templates or printing from digital to digital processes still necessitates an analysis of form and materials. We architects need to make sense of the information that we put into a model and extract in a way that facilitates the actual construction process.

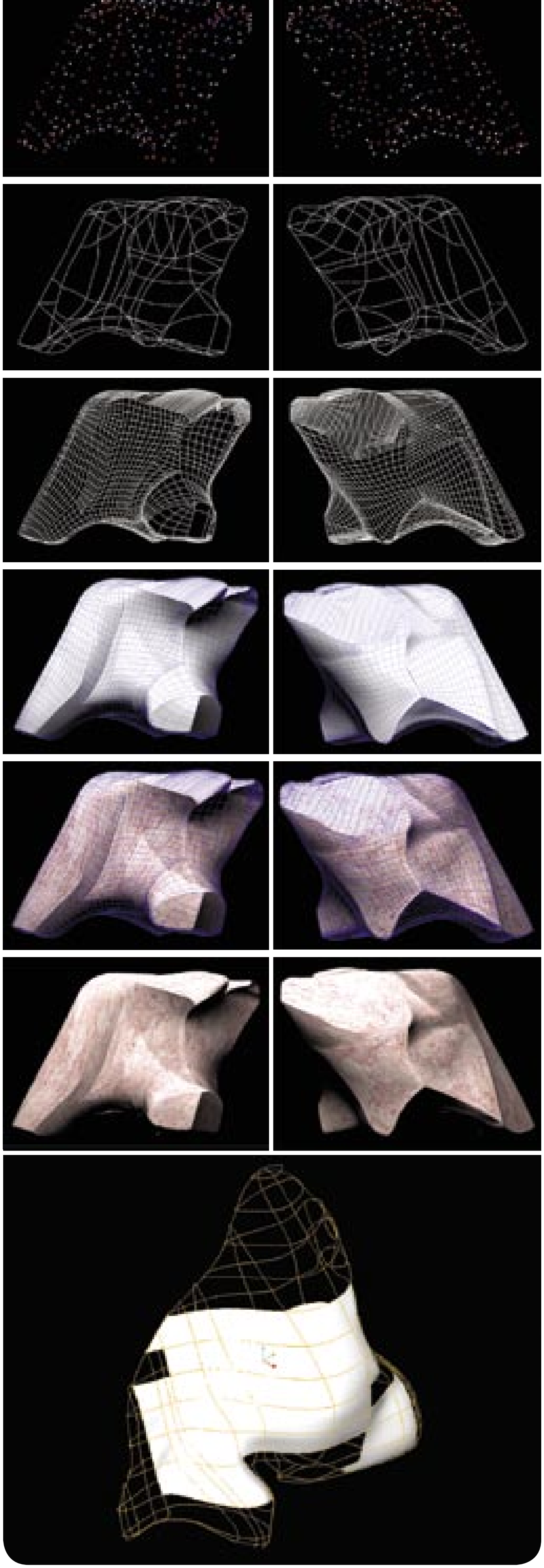
In my teaching and research at the University of Kentucky, College of Design-School of Architecture I am advocating a more collaborative, flexible systems approach to assembly. In order for new forms to emerge within this context, we need to design for real-world, full-scale assembly that would help us shift way from unnecessarily complex models to devote more time to innovative compositional strategies that reflect the realities of construction processes and animate the radical differences between the drawn and the actualized. To this end, my studios seamlessly flow from digital to manual, from digital to digital, and from manual to digital. The project represented here, the Resonance House, demonstrates how a typical design-build/fabricate-assemble semester unfolds and examines the relationship between the drawn, the built and the assessed outcome of that process.

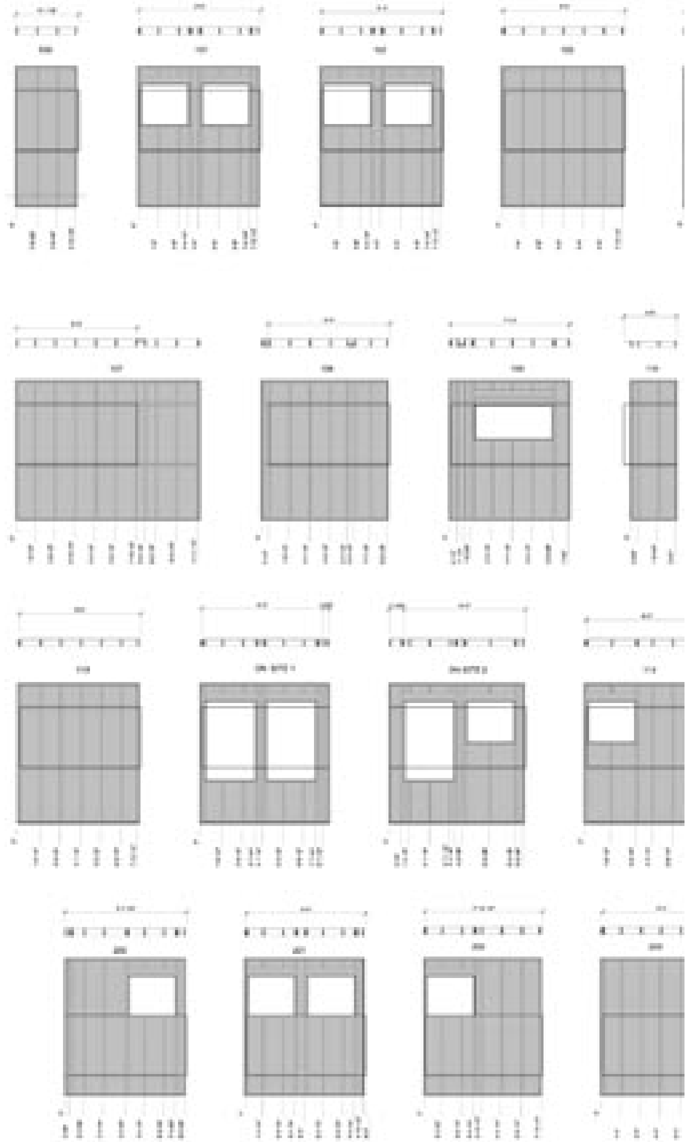


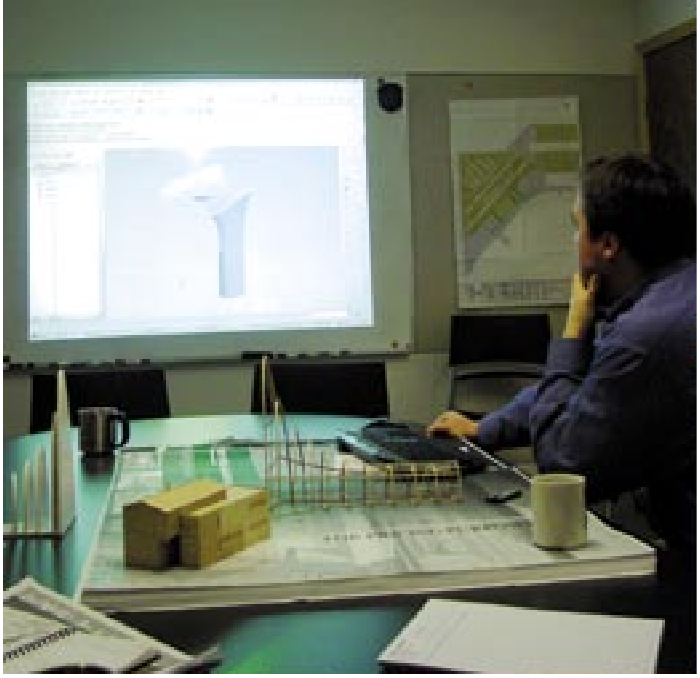


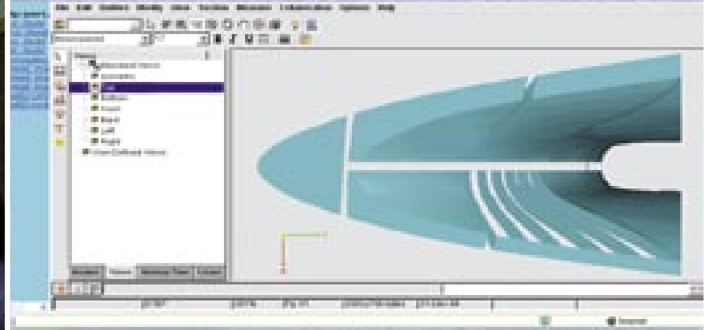
THE RESONANCE HOUSE

The Resonance House is a contemporary, single-family residence located in the Western Suburb Historic District in downtown Lexington. The project, designed under the direction of Gregory Luhan, a professor in the School of Architecture, and built by his students at the University of Kentucky College of Design, was enabled by a unique relationship between UK and Design Lab, Inc., a private, not-for-profit, 501c3 corporation whose mission is to enhance the built environment through design and research. This 5-star Energy Star home is a sustainable-oriented demonstration project that is one of twelve test markets sponsored by the US Green Building Council for its new LEED for Homes Program. Upon completion in early 2006, this house will certify at the Gold Level. Key features include a 1,500 sqft basement, custom redwood and copper siding, passive sun-screen devices, hardwood and slate floors, Energy Star appliances, custom cabinetry, a “Light Vortex”, a common pervious concrete driveway, and a detached, two-car carport. The flooring and staircase details resulted from the design team’s research and development collaboration with the UK Department of Forestry and the Wood Utilization Center. In this context, trees were sourced, cut, and milled with a portable milling machine, kiln-dried and, using custom designs, profiled into its current configuration. The remnants of this cradle-to-cradle process were then butchered-blocked back together to form a sequence of treads for the two-story, open-riser staircase. The digital-to-digital sculptural element, known as the Light Vortex is a two-story stainless clad figure that covers the fireplace and mechanical system. It also anchors the entry of the house. This element, designed in **form·Z** and then translated into Catia, is being fabricated for Design Lab by the A Zahner Company in Kansas City, Missouri.









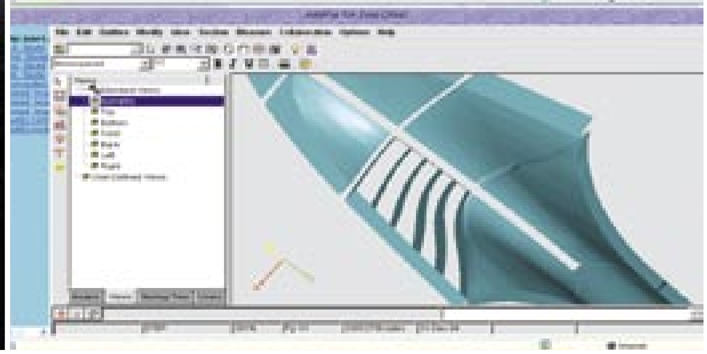


Table of Contents | Next Article >