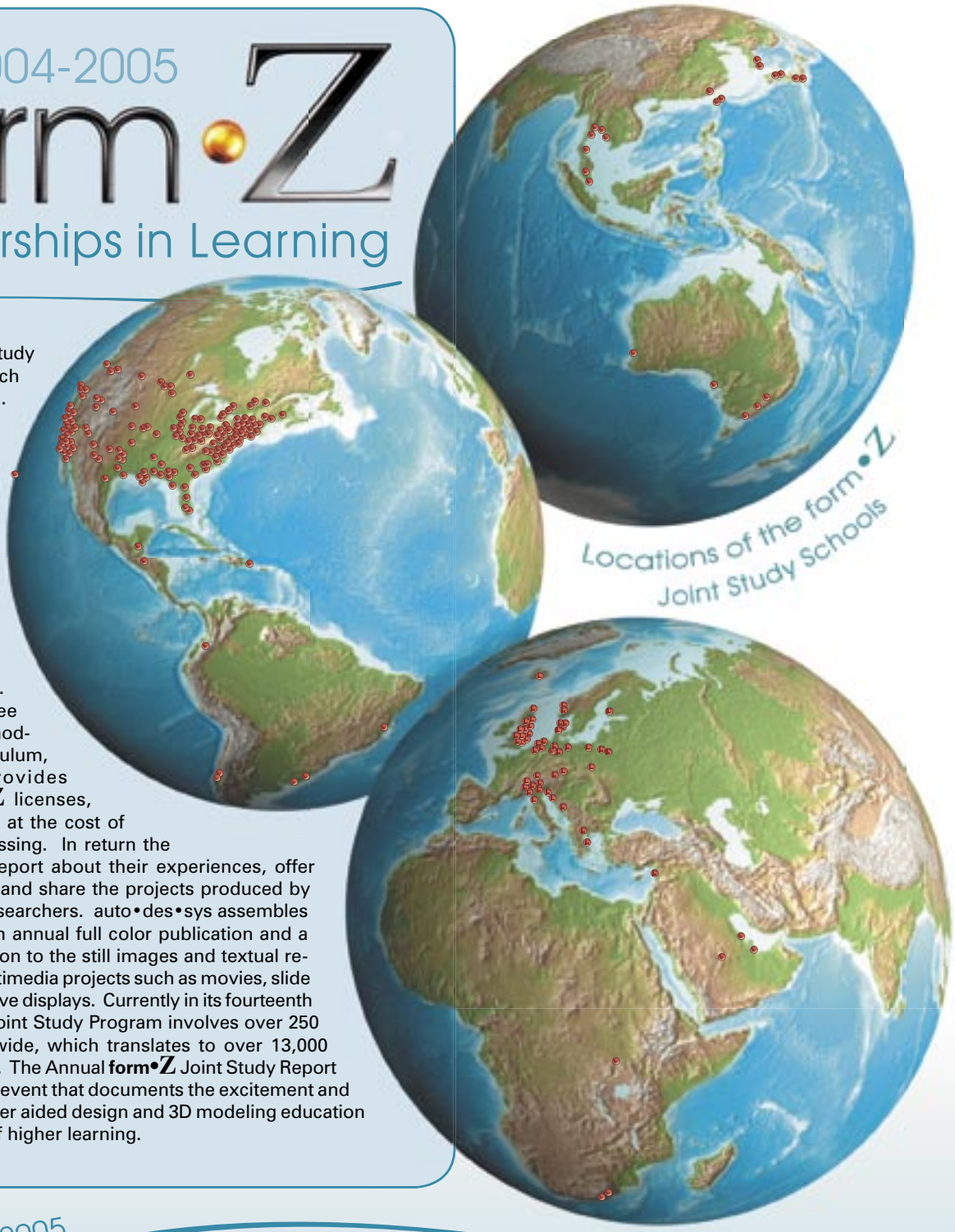
form·Z

Joint Study Program Report

2004-05

Partnerships in Learning 13

2004-2005 form•Z Partnerships in Learning



The **form•Z** Joint Study is a program by which auto•des•sys, Inc. supports and subsidizes the learning of the new digital tools, primarily 3D modeling, by students at Universities and Colleges worldwide. In recent years, the program has also included a number of high schools. When schools agree to incorporate 3D modeling in their curriculum, auto•des•sys provides them with **form•Z** licenses, one year at a time, at the cost of material and processing. In return the schools agree to report about their experiences, offer recommendations, and share the projects produced by their students or researchers. auto•des•sys assembles this material into an annual full color publication and a CD, which, in addition to the still images and textual reports, includes multimedia projects such as movies, slide shows, and interactive displays. Currently in its fourteenth year, the **form•Z** Joint Study Program involves over 250 Universities worldwide, which translates to over 13,000 student seats a year. The Annual **form•Z** Joint Study Report has evolved into an event that documents the excitement and progress of computer aided design and 3D modeling education in the institutions of higher learning.

December 2005

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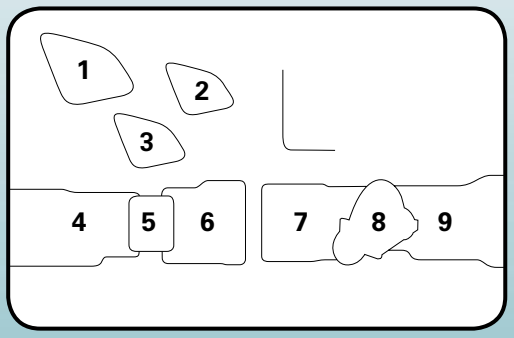

1. **Dan Tesene** - Minneapolis College of Art and Design
2. **Po-Yi Lee** - Tamkang University
3. **Mor Rotbart** - Holon Academic Institute of Technology
4. **Tamer Fawzy** - American University of Sharjah
5. **Michael Magee** - Texas Tech University
6. **Jacob Aftreth** - California Polytechnic State University
7. **Chloé Ritchie-Duval, Alexandre Duplessis, Eda Romero-Castro, Nicolas Vallet, and Guy Mancilla** - CEGEP de Saint-Laurent
8. **Genki Harada** - Tama Art University
9. **Sabine Roediger** - Hochschule für Gestaltung und Kunst Zürich

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form•Z Joint Study Printed Report

About the 2004–2005 form•Z Joint Study Report

2005 coincided with the founding of **auto•des•sys** 15 years ago and 2006 marks **form•Z**'s 15th anniversary since the release of version 1.0. We cannot help but reminisce a little and think back to the day we talked to one University to get on board the Joint Study Program as a feedback mechanism to our development efforts. It is not an hyperbole to say that the program very quickly snowballed into what it represents today. It has been a pleasure to work with academia to help introduce hundreds of thousands of young designers to computer aided applications in their current studies and future practices. It keeps us young at heart, and serves as an extension of the academic background that **auto•des•sys** came from.

It is with great pride and honor that we present the "lucky" 13th edition of the **form•Z** Joint Study Report. As usual, it consists of two parts: a thematic printed report, and an all inclusive CD that a number of the PIs call a "catalogue" format.

The thematic format for the printed portion of the report was adopted last year to avoid repetition and redundancies that had started to appear after a decade of JS reports. The decision to switch came after consulting with the PIs. At that time, while a strong majority agreed with the thematic format, there were also quite a few skeptics who preferred the all inclusive catalogue style, mostly because it gives significantly more students the opportunity to be published. However, during the evaluation process of last year's report only one PI advocated the return to the "old" format. The comments of the majority of the respondents were rather enthusiastic about the continuation of the thematic format. Details of these responses and some quotes can be found in the last section of the "What we learned..." article at the end of this publication.

The material published in this year's report was submitted in response to both general and individual invitations. At the end of the last academic year, PIs were given the opportunity to include thematic papers, in addition to their general reports. We initially received 4 papers in response to this invitation, all of which have been included. After compiling and reviewing the Joint Study material, 37 schools were selected and the PIs were approached to submit an article based on the material they had provided. These articles were to be written either by the PI, or an instructor of a class, or a student, or some combination of these. Our criteria for selecting the material were based on originality of approach, completeness, level of articulation, innovative thinking, and above all effective usage of digital tools for the generation of imaginative forms. To say it differently, for doing things with the computer that are hard, if at all possible, to do by hand. All PI's were offered this opportunity along with the individual invitations.

All but 4 of the 37 PIs we invited individually accepted with enthusiasm. 5 more submissions came from the general invitation and 3 were accepted. At the end, we had 40 articles representing 29 schools, including one high school. Half (or 20) of the articles are written by PIs or Instructors, 18 by students (7 by graduate and 11 by undergraduate students), and 2 are co-authored by students and instructors. About half came from the United States and the other half from overseas.

While no attempt was made to group the articles, since each is quite unique, they can be viewed under a number of thematic categories. There are at least 7 articles that deal more or less directly with the use of digital tools for the generation of innovative forms. Another 8 articles present specific building designs and 5 more present specific urban design schemes. The common denominator for all is the use of the digital tools to create forms that are distinctly different from traditional forms.

A group of some 6 papers specifically discusses and compares digital versus analogue methodologies. In all cases, the former are more persuasive. Fabrication or computer aided manufacturing (CAM) is represented by at least 3 papers, while hints of digital fabrication can be found in a number of other papers as well. 6 articles are directly concerned with education: either the theoretical ties of digital design to "ancient principals" or how to develop particular skills. The only paper from a high school elaborates on this topic. Finally, there are 5 articles that cannot be grouped with the above categories but would fit in a category possibly labeled "miscellaneous theories." For example, "Transforming Habit" and "Interpreting Babel" would belong to such a category.

The printed report starts with a display of the 2004-05 Joint Study Award winners. Quite a few show up in the articles as well, as some of the designers were invited to elaborate more on their work by writing a thematic article. We felt that it was important to honor the award winning students distinctly and that readers would forgive the repetition.

Year after year, when we ask the PIs to evaluate the JS Report, we are told that the most recent one has surpassed all the previous reports in appearance and content. While we have to recognize that it becomes harder to exceed expectations every year, we hope that we have managed to do so one more time. We would like to hear what you think and will be looking forward to receiving your comments and impressions. We, once again, feel strongly that this report contains some intriguing form explorations that suggest a refreshing new era of design. We sincerely thank all the authors for sharing their thoughts and work with us.

C.I.Y.

The 2004-2005 Joint Study Awards

One of the traditions the **form•Z** Joint Study Program and its report have established is the annual awards presented to deserving students for their exceptional work. This year eight awards of distinction and eight honorable mentions have been granted.

THE NOMINATIONS

To qualify for an award, a student should be nominated by the Principal Investigator (PI) of the JS school where he/she is enrolled. In addition to the images, the PI submits a summary description of the nominated project and states the reasons for which he/she thinks the nominated student deserves an award. This year, there were 105 nominees from 58 different schools.

THE CATEGORIES

The nominated projects were divided in eight categories: Architectural Design, Interior Design, Urban and Landscape Design, Fabrication, Product and Industrial Design, Visualization/Illustration, High Schools, and Animation. One Award of Distinction was granted in each category and a variable number of Honorable Mentions.

THE JURY

The selection of the awards was made by five jurors outside of auto•des•sys, all experts or theorists of computer aided design. They are listed below, in alphabetical order.

- **Christian E. Allebosch**, Industrial Designer, The Clever Lemon Co.
- **Greg Conyngham**, Integrated CADD Services
- **Kelly Dove**, Editor-in-Chief, Cadence
- **Loukas Kalisperis**, Professor of Architecture, Pennsylvania State University
- **David Wolf**, Architect, Architects Toolbox

JOINT STUDY AWARD WINNERS THAT ATTENDED THE ACADIA 2005 CONFERENCE

From left to right are:

Mor Rotbart - Award of Distinction in Visualization and Illustration, Holon Academic Institute of Technology, Holon, Israel; **Jeffrey R. Olgin** - Award of Distinction in Architecture, Texas Tech University, Lubbock, Texas, USA; **Genki Harada** - Award of Distinction in Product Design, Tama Art University, Tokyo, Japan; **Sebastian Guevara Sinclair** - Award of Distinction in Urban Design, Pontificia Universidad Católica de Chile, Santiago, Chile; **Dan Tesene** - Award of Distinction in Fabrication, The Minneapolis College of Art and Design, Minneapolis, Minnesota; **James Diewald** - Award of Distinction in Animation, Miami University, Oxford, Ohio, USA; **Po-Yi Lee** - Award of Distinction in Interior Design, Tamkang University, Tanshui, Taipei, Taiwan.

THE PROCESS

The projects of all the nominees were sent to the jurors as Acrobat documents on CD-ROMs that also included animations that accompanied some of the submissions. Names and school affiliations were not included. The jurors returned their selections for the eight awards and grades (0 to 10) for each of the other projects. Selection of a project for an award was considered equivalent to a grade of 15. The grades were averaged and the one project from each category receiving the highest grade was selected for the award. Projects receiving an average grade 9 or higher were selected for the honorable mentions. The jury was also asked to comment on why they selected these particular projects. Their comments are included with the displays of the award of distinction and honorable mention winning projects.

THE PRIZES

All Awards of Distinction are receiving a **form•Z** RadioZity license with one year technical support and updates. They are also invited, expenses paid, to attend ACADIA 2005, where the awards are officially announced. In addition, auto•des•sys will wave the processing costs of a 10-seat JS license for the school they attend, for next academic year. Honorable Mentions receive diplomas acknowledging the award.

Jeff Olgin FOURTH YEAR, ARCHITECTURAL STUDIO IV

Institute for Jazz Studies at Fort Adams Park

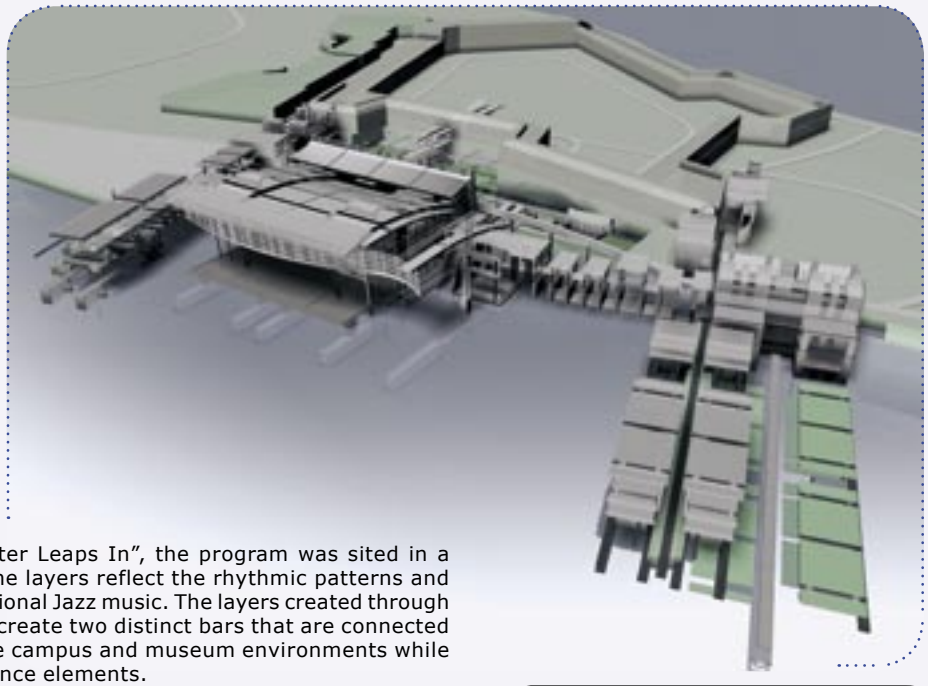
ADVISOR/PRINCIPAL INVESTIGATOR: BENNETT R. NEIMAN

COLLEGE OF ARCHITECTURE
TEXAS TECH UNIVERSITY, LUBBOCK, TEXAS

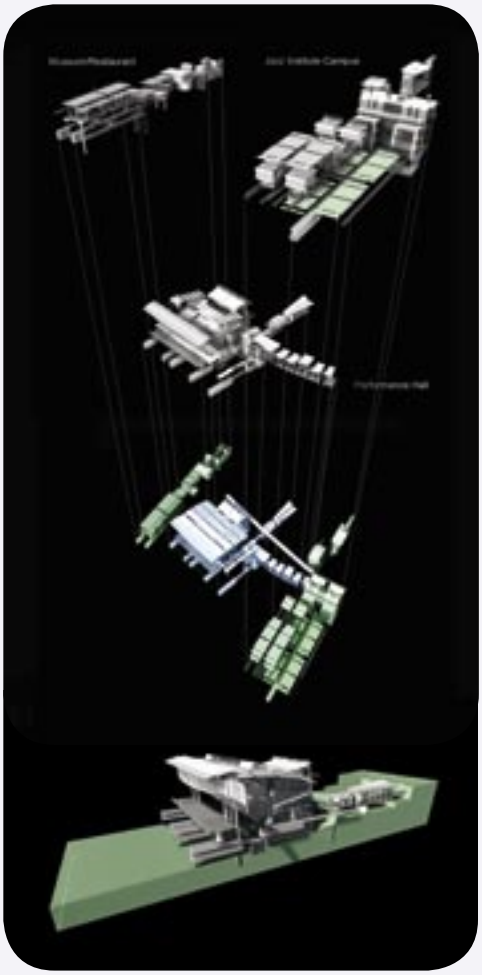
* SEE THIS COMPLETE PROJECT ON PAGE #46.

SUMMARY DESCRIPTION OF PROJECT:

The diagrammatic analysis of "Lester Leaps In" generated a series of collages and tracings consistent with musical notation and structure. This collage sequence allowed for subsequent investigation of the Fort Adams site. Further analysis of the collage produced layered line tracings that were reconfigured into speculative sections. The spatial relationships found in the relief studies and layered slice models were developed from this series of section drawings. The collage sequence introduced a series of scaled tracings derived from the structure and detail seen in the original diagram. These tracings act as a bridge between the diagram sequence and the sectional analysis. The Institute for Jazz Studies program required the following major components: Campus, Tourist Traps, Performance, Gardens, Plazas, and Transportation.



Through the diagrammatic analysis of "Lester Leaps In", the program was sited in a manner consistent with musical notation. The layers reflect the rhythmic patterns and fluctuations that occur throughout improvisational Jazz music. The layers created through diagrams positioned on the Fort Adams site create two distinct bars that are connected by a bridge element. The two bars house the campus and museum environments while the bridge connects the music and performance elements.



REASONS FOR THE NOMINATION:

This student's studio project exemplified the processes and methods of abstraction as generators of form that were required in this studio. This project reflects a fluid transition from early concept to architectural development. The design elements interact with the historic Fort Adams site, which remains independent, but feels as if it is in a call and response dialogue with the new complex.

Because of the intricacy and complexity of the early analytic collages, the student was challenged by the instructor to learn and employ **form•Z** as the primary design and representation tool. Critical to the project was **form•Z**'s ability to synthesize form, allowing for the rapid generation of multiple prototypes, which were evaluated and adapted to improvisational circumstances. **form•Z** facilitated an imaginative expression of form, light, and surface that would not have been readily possible with traditional modeling methods. Through digital modeling, the student was able to constantly change and modify the project without investing heavily into rigid physical models. Rather than working within a confining physical medium, the student worked with flexible media that allowed the design to constantly grow and change over time.

JURY COMMENTS:

This project uses a series of views to carefully provide a visual interpretation of the program while leading the viewer through the design process. The subtle choice of colors in the rendering further strengthens the professionalism in this presentation.

• **Greg Conyngham**

This is a big architecture project! And the result looks very realistic and achieved. I especially like the integration between land and sea in a very fluid building design. Technical views are readable at a glance and technical building solutions are obvious.

Modeling explains the concept very well. The presentation is clear and the rendered views integrating real life make me feel like I want to assist the next festival or just be there to enjoy a drink.

A very professional work and a very attractive building.

• **Christian Allebosch**

THIRD YEAR, ARCHITECTURAL STUDIO **Jacob Aftreth**

Indian Ocean Tsunami Memorial

DEPARTMENT OF ARCHITECTURE
CALIFORNIA POLYTECHNIC STATE UNIVERSITY,
SAN LUIS OBISPO, CALIFORNIA

ADVISOR/PRINCIPAL INVESTIGATOR: THOMAS FOWLER, IV

SUMMARY DESCRIPTION OF PROJECT:

The memorial reflects on the lost lives from this horrific event of December 27th, 2004, killing 225,000 persons.

The program for the project includes a reading space for the display of scientific and historical information about tsunamis. Additional spaces include a grand exhibition space, a multi-purpose space, etc.

The project's concept is fracture. The idea behind the building is to have the project's configuration relate to the feeling of destruction and loss that the tsunami caused by developing fractured forms and spaces. The play of light through translucent laminated glass elements and different reflectances on interior surfaces creates a unique experience for the visitor. The structure of the memorial is constructed with tension cables and glass envelope in a seemingly random configuration. The grand space is composed of a series of passageways and a large staircase with large sculptural elements created from the debris created by the tsunami.

REASONS FOR THE NOMINATION:

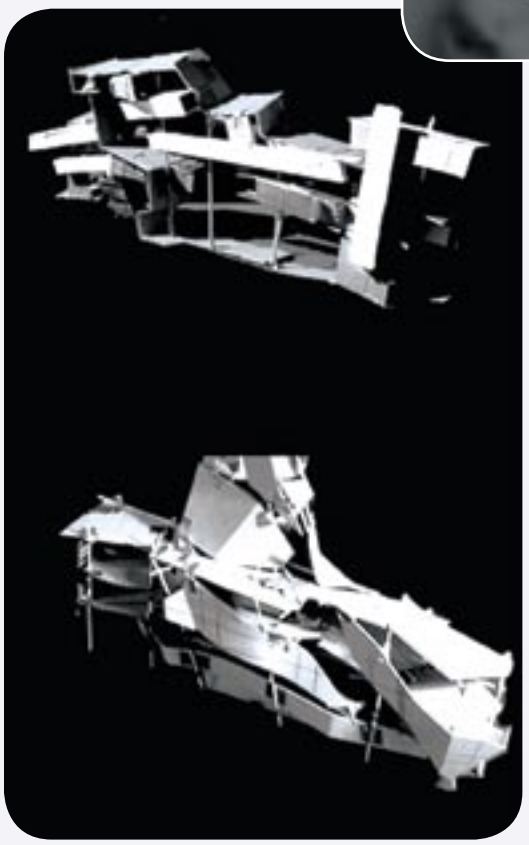
Student's project visibility shows the design evolution via computer models. The development of the project's envelope and interior spaces align very well with the intended concept for the project.

* SEE THIS COMPLETE PROJECT ON PAGE #26.

JURY COMMENTS:

The presentation and the use of media strongly captures the design intention, which is immediately apparent at first impact. The renderings and overall presentation as well as the animation strongly clarify the designer's intentions and clearly convey the appropriate emotion to the viewer. The sense of "fracture" is fully developed in both the presentation and the design. It is a very powerful statement.

- **Loukas Kalisperis**



Sebastian Guevara Sinclair MASTER'S, TALLER PASEO AHUMADA

Urban Mobility Mapping

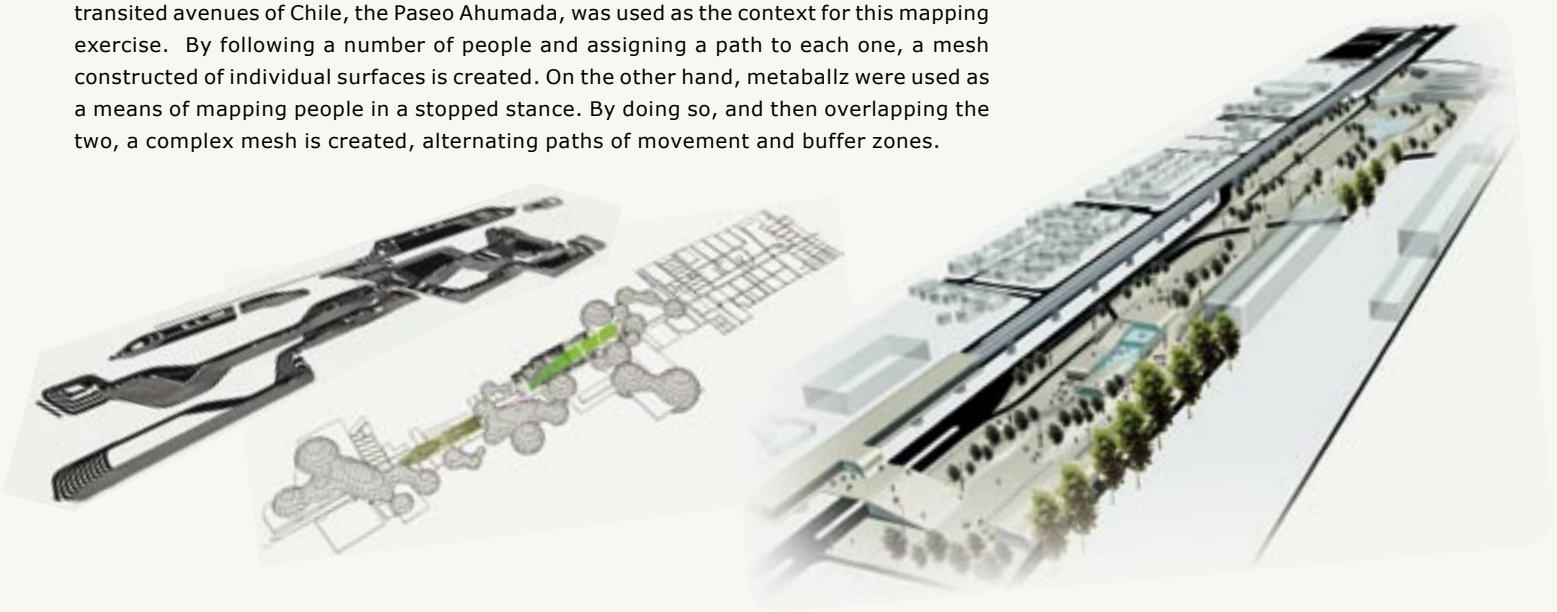
ADVISOR/INSTRUCTOR: SERGIO ARAYA, PABLO SARIC
PRINCIPAL INVESTIGATOR: CLAUDIO LABARCA

ESQUELA DE ARQUITECTURA
PONTIFICA UNIVERSIDAD DE CATOLICA
SANTIAGO, CHILE

SUMMARY DESCRIPTION OF PROJECT:

An exercise in the construction of path extrusions and metaballz. One of the most highly transited avenues of Chile, the Paseo Ahumada, was used as the context for this mapping exercise. By following a number of people and assigning a path to each one, a mesh constructed of individual surfaces is created. On the other hand, metaballz were used as a means of mapping people in a stopped stance. By doing so, and then overlapping the two, a complex mesh is created, alternating paths of movement and buffer zones.

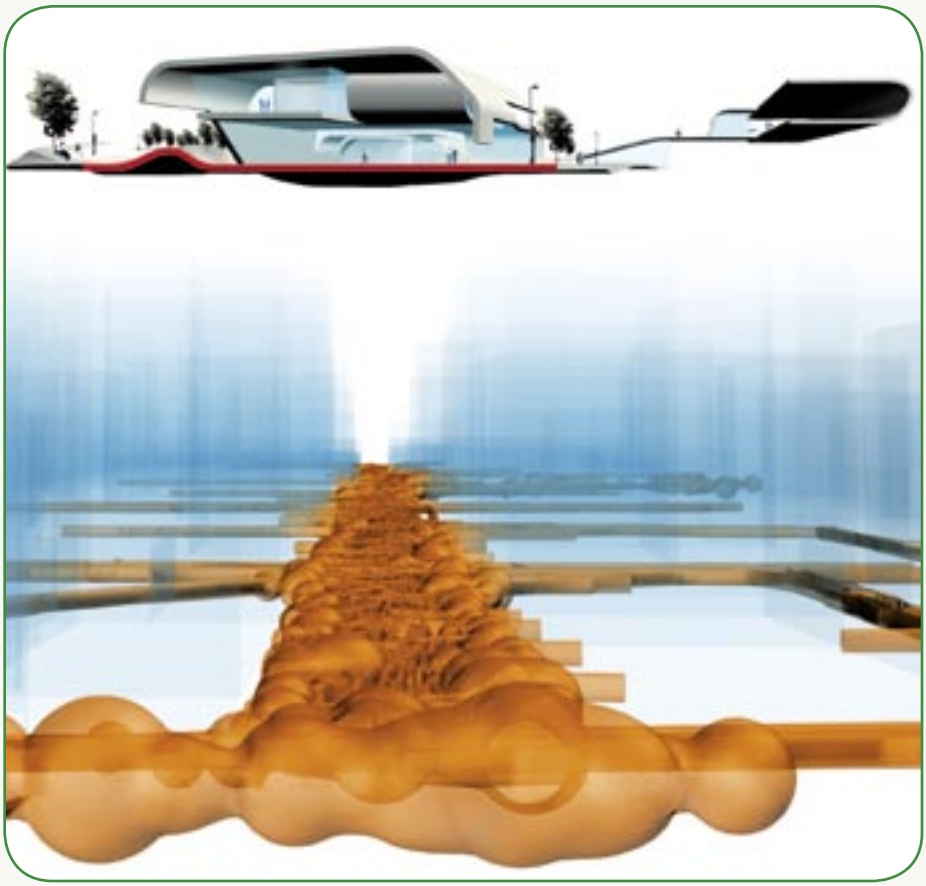
* SEE THIS COMPLETE PROJECT ON PAGE #102.



REASONS FOR THE NOMINATION:

The digital tools here are used as a means of defining the morphology of his project. Tools are used as an abstract means of development and representation, working with flows and particles to define movement and stationary elements within the project.

By working with contours, displacements, and folded sheets, new geometries are created, allowing a smoother interaction between landscape and programme.



JURY COMMENTS:

Using metaformz to model the nuanced mechanics of urban circulation patterns is an inspired choice. Urban mobility mapping takes that idea from conception and analysis through to an urban design solution that is deduced from these studies. An excellent use of free-form modeling tools to communicate free-form human movement.

- **David Wolf**

This project is arguably one of the most convincing and appropriate uses of meta-balls in Urban Design. The presentation and the design proposal have a strong delineation of paths while preserving the generating organic system with a clear and convincing use of media. In addition, the contextual presentation is very complete.

- **Loukas Kalisperis**

FIFTH YEAR, DESIGN STUDIO **Josh Anderson**

Urban Scarring

HONORABLE MENTION

DEPARTMENT OF ARCHITECTURE
UNIVERSITY OF COLORADO AT DENVER,
DENVER, COLORADO

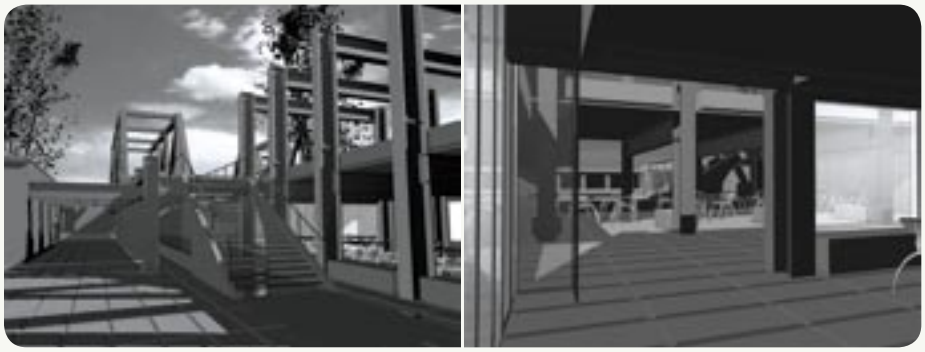
ADVISOR/INSTRUCTOR: MICHAEL HUGHES
PRINCIPAL INVESTIGATOR: SHANE RYMER

SUMMARY DESCRIPTION OF PROJECT:

Scarring results from a process of repair, which unites separate parts/pieces, while simultaneously constructing a visible memorial to the rift. Within the realm of urban intervention, scarring presents a new development model capable of revealing both the history of spatial separation and the process of repair. To begin this process of scarring, a suture is needed as an initial cohesive element. The suture is a foreign intervention and temporary connective device, which enables reconstruction over a period of time.

The site, a series of fragments loosely connected by the linear park system located along Cherry Creek in Lower Downtown Denver, lacks any substantial spatial connection to the surrounding urban landscape. The suture was used as a conceptual and formal device in an attempt to reconnect these separated spaces back into the life of the city while creating a distinct and alternative urban experience. The suture, in the form of a coherent program consisting of cultural and entertainment venues, enables these separate sites to be linked/unified through a series of event spaces to be implemented over time. This insertion of these new event spaces acknowledges the complex sectional quality of the site and weaves new points of connection between the existing pedestrian pathways at street level in Lower Downtown and the lower level of recreational activity (parks, bike paths, and open spaces) existing below street level along the Cherry Creek corridor.

The first event program deployed, and the focus of this project at the architectural scale, will be a new Museum of Contemporary Art.



REASONS FOR THE NOMINATION:

Throughout the project **form•Z** was used extensively to model, explore, and represent the spatial complexity of both the given urban context and the proposed architectural intervention. Modeling the site in **form•Z** at the beginning allowed the design process to evolve from the perspective of experiential inhabitation. This focus on designing from the inside or, more specifically, from the occupant's point of view, enabled the student to engage a subtle exploration of light and texture as a method for integrating architecture into the urban landscape.

JURY COMMENTS:

A very clear and understandable project even if not an easy one to connect all these parts of an existing landscape. The project is so evident that I would really like to see the scaled model. This project is mixing architecture and Urban Design...very good integration!

The modeling in **form•Z** is nothing complicated but very well mastered. The grayscale pers. (as well as pictures of the scaled model) views are not only very well made but add to the simplicity of the design and lead to the essential comprehension for all. A really good and realistic project.

• **Christian Allebosch**

* SEE A MORE COMPLETE PRESENTATION OF THIS PROJECT ON PAGE #322 OF THE CD.

Luis Fernando Calderon, Giacomo Bilz, Luis Pedro Brol, Antonio Arroyave, Rodrigo Cabrera, Carlos Herrera, and Ricky Titus

Master Plan La Auroa

HONORABLE MENTION

9TH SEMESTER,
ADVANCED DESIGN STUDIO

ADVISOR/INSTRUCTOR: DAVID GARDA
PRINCIPAL INVESTIGATOR: HECTOR SANTAMARINA

FACULTAD DE ARQUITECTURA
UNIVERSIDAD FRANCISCO MARROQUIN,
GUATEMALA CITY, GUATEMALA

SUMMARY DESCRIPTION OF PROJECT:

* SEE THIS COMPLETE PROJECT ON PAGE #64.

Proposal of the "Aurora" Master Plan, if the local International Airport relocates its facilities away from the city in the future. All the students worked in the final design proposal, but each one of them had to design different buildings individually.

Interior Design

FOURTH YEAR, DESIGN STUDIO IV **Po-Yi Lee**

Facilities for Relaxation in the Offices

DEPARTMENT OF ARCHITECTURE
TAMKANG UNIVERSITY
TANSHUI, TAIPEI, TAIWAN

ADVISOR/PRINCIPAL INVESTIGATOR: CHEN-CHENG CHEN

SUMMARY DESCRIPTION OF PROJECT:

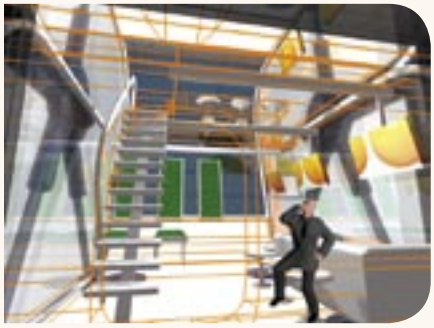
The original intention of this assignment was to ask students to integrate at least 6 facilities (3 small ones, 2 medium ones, and a large one) into a building, or a street, or a district. Students generated design works through observations and imaginations for interpreting their concepts of "urban nomads". An existing office building in Taipei was chosen for this project, generating a scenario of an office worker's day.

* SEE THIS COMPLETE PROJECT ON PAGE #70.

REASONS FOR THE NOMINATION:

This is a very interesting project, the designer – He had his sense of humor. He employed **form•Z** to generate 3D design to express his observation of our daily office life, and his criticism for such a hard-working existence. Excellent use of colors and materials yielded exceptional results for this project.

A regular working day starts.



Take a deep breath and shout before entering the office.

Take a squirt gun and shoot at the subway train.

JURY COMMENTS:

This project exhibits an innovative use of representational techniques to simulate and predict environmental behavior with an excellent multidimensional explanation of the possible solution space. The student submitted an elegant, convincing, and pleasing design presentation with a level of detail that enhanced perception and understanding. This presentation accomplishes an excellent sense of "presence".

- **Loukas Kalisperis**

This Interior Design demonstrates what a creative Studio session is made for! This student definitely has a very creative mind. And you can feel passion through the models. This student also has a very good sense to express and display his/her designs in a very clear manner through the use of C.G. (in this case form•Z). All forms and functions are evident. Pers. views are very elaborated. I'm not sure I would like to live in such an environment (makes me think of the 5th Element movie). An Interior Designer must be "crazy" before being rational. Nice piece of "madness".

- **Christian Allebosch**

Aditi Amalean

FORTH YEAR, INTERIOR ARCHITECTURE DESIGN STUDIO III

Designing a Contemporary Art Museum

ADVISOR/PRINCIPAL INVESTIGATOR: TINA SARAWGI

DEPARTMENT OF INTERIOR ARCHITECTURE
UNIVERSITY OF NORTH CAROLINA AT GREENSBORO,
GREENSBORO, NORTH CAROLINA

SUMMARY DESCRIPTION OF PROJECT:

The project involved redesigning the Weatherspoon Art Museum located in the University of North Carolina at Greensboro. The opportunity involved designing a suitable museum environment which will appeal to a wide spectrum of public interests, exploring an appropriate physical definition and public face to an evolving contemporary cultural environment using cutting edge technologies. Investigation on how these technologies change our relationships with museums, art, and one another was to be further examined.

REASONS FOR THE NOMINATION:

The work of this student has been exceptional inspiring other students. In this project she redesigns a contemporary art museum catalyzing it with learning, relaxation and entertainment opportunities around a central atrium space.

The project proposes a Series of gallery spaces, with a range of volumes to accommodate the diversified display requirements of contemporary artwork. Learning environments such as studios, classrooms and media lounges for research and art education are interspersed with the galleries to encourage learning about contemporary art. Social spaces such as a café, are provided to complement the experience, for informal discussion and reflection.

The spaces accommodating these activities derive their volume and orientation from their function infusing the atrium space with dynamism and energy.

The student uses **form•Z** effectively to reveal the volume, materiality and spirit of the place. The final design is a successful interplay of solid and void, light and shade, and motion facilitated through the use of **form•Z**.

* SEE A MORE COMPLETE PRESENTATION OF THIS PROJECT ON PAGE #416 OF THE CD.

Central Atrium Space

Media Lounge

Cafe

Gallery - third floor

Media Lounge

Product Design

SECOND YEAR **Genki Harada**

Motor Bike

PRODUCT DESIGN DEPARTMENT
TAMA ART UNIVERSITY
TOKYO, JAPAN

ADVISOR/PRINCIPAL INVESTIGATOR: JOHN LEAVER




SUMMARY DESCRIPTION OF PROJECT:

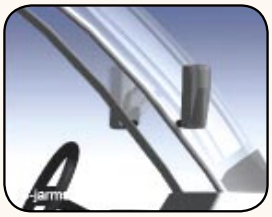
Students selected the type of projects that they wanted to model and represent for their final project of the year. This student designed a Motor Bike.

REASONS FOR THE NOMINATION:

* SEE ALSO PAGE #127.

Many students chose an existing product to model and render for their final project but this student took it upon himself to design a project that explores the possibilities of motor bikes. One reason for its selection is the effort that went into this project, which resulted in a design and final presentation of high quality.





The major concept behind the design is that of rounded or circular forms. Its inspiration comes from the circular tire form which is expressed in various parts of the design. The rain guard also follows this theme and this is a desired item here in Japan where the rainfall is considerable, especially during the rainy and Typhoon seasons. Also this student decided to provide some color variation studies to add to the product's selection potential. I feel this project is very deserving of an award.

JURY COMMENTS:

This innovative design for an urban vehicle is a succinct and convincing presentation of the idea as well as the product, within elegant renderings and a convincing level of detail. This is a strong and powerful, yet sensitive, design and presentation.

- **Loukas Kalisperis**

A spectacular product design that clearly illustrates **form•Z**'s tools in exploring cohesive design through the integration of curved shapes to integrally form the parts. This exploration is further continued with color alternatives for the body and the diagrammatic illustration accompanied by larger detail views.

- **Greg Conyngham**

Yasuhide Yokoi SECOND YEAR

Hand Drill

ADVISOR/PRINCIPAL INVESTIGATOR: JOHN LEAVER

PRODUCT DESIGN DEPARTMENT
TAMA ART UNIVERSITY
TOKYO, JAPAN

SUMMARY DESCRIPTION OF PROJECT:

The design of a "hand tool" in which the students selected the type of tool they wanted to design. After research of the desired tool a design was created and developed to fulfill the design requirements.

REASONS FOR THE NOMINATION:

The design of this project and the visualization using **form•Z** are the primary reasons for selecting this project as an award candidate. The research behind the design of this hand drill determined that the gun-held style was a little unstable and difficult to control when beginning to drill a hole. This design locates the center of gravity of the drill motor in the center of the hand which makes it easier to control and aids in higher performance quality. In addition the location of the drill rotation direction switch was placed at the top of the drill making it easier to understand the rotational direction. The final presentation required an exploded view of the parts of the assembly and this project used **form•Z** effectively to accomplish this objective. Its design and computer modeling are of high quality and I feel it is deserving of an award.

JURY COMMENTS:

This one is my favourite. Even if I have some technical points to clear out (but it is already done in my mind!). For a 2nd year student, he/she has the right 'mind' to be a Product Designer. Ergonomy, visual attraction (colors, sensual look, evidence of functions), and tech integration are well mastered. Renderings are what they are made for: comprehension of the model. Anyway, a lot better than all the cordless screwdrivers I have seen on the market! A classic well revisited...and it is not an easy exercise to re-create the wheel!

• **Christian Allebosch**

* SEE ALSO PAGE #126.

Mor Rotbart SECOND YEAR, FIRST COURSE OF FORM•Z

Wasp

ADVISOR/PRINCIPAL INVESTIGATOR: GADI FREEDMAN

INDUSTRIAL DESIGN DEPARTMENT
HOLON ACADEMIC INSTITUTE OF TECHNOLOGY,
HOLON, ISRAEL

SUMMARY DESCRIPTION OF PROJECT:

This beautiful imaging of highly complex organic forms was built with the most current tools, mostly NURBS, to an amazing accuracy and detail. To add to the detailed modeling work, custom made textures were added resulting in a lifelike project.

JURY COMMENTS:

Let me make it clear: I hate wasps and hornets! Nevertheless, when I see a 2nd year student who has mastered nurbz at the level of this project, it has to be seen as a piece of art. Posture, proportions, almost 'life like' images comprise a job very well done. To offer a suggestion, the student might have looked at a real wasp with a magnifying glass to extract more accurate textures, but this would be to further improve the details of an already excellent work.

• Christian Allebosch

This is an excellent demonstration of the possibilities of technology used in the appropriate manner in order to enhance the understanding of the artifact. The project had very sensitive representation of form and detail as well as impressive control of geometry and proportion, especially for a second-year student.

• Loukas Kalisperis

* SEE THIS COMPLETE PROJECT ON PAGE #130.

THIRD YEAR, TECHNICAL SCHOOL

Chloé Ritchie-Duval, Alexandre Duplessis, Eda Romero-Castro, Nicolas Vallet, and Guy Mancilla

Jubilee Church

DEPARTMENT OF ARCHITECTURE
CEGEP DE SAINT-LAURENT
VILLE SAINT-LAURENT, QUEBEC, CANADA

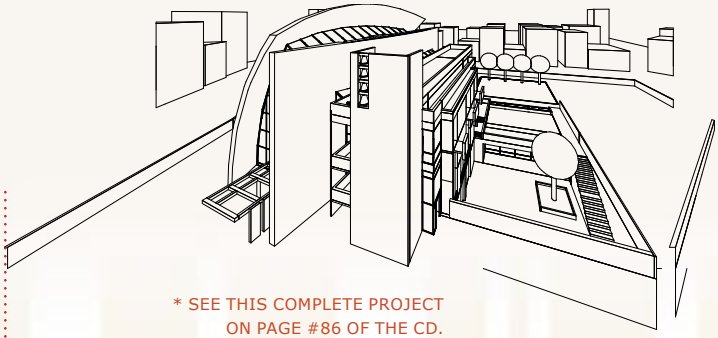
ADVISOR/PRINCIPAL INVESTIGATOR: PIERLUCIO PELLISSIER

SUMMARY DESCRIPTION OF PROJECT:

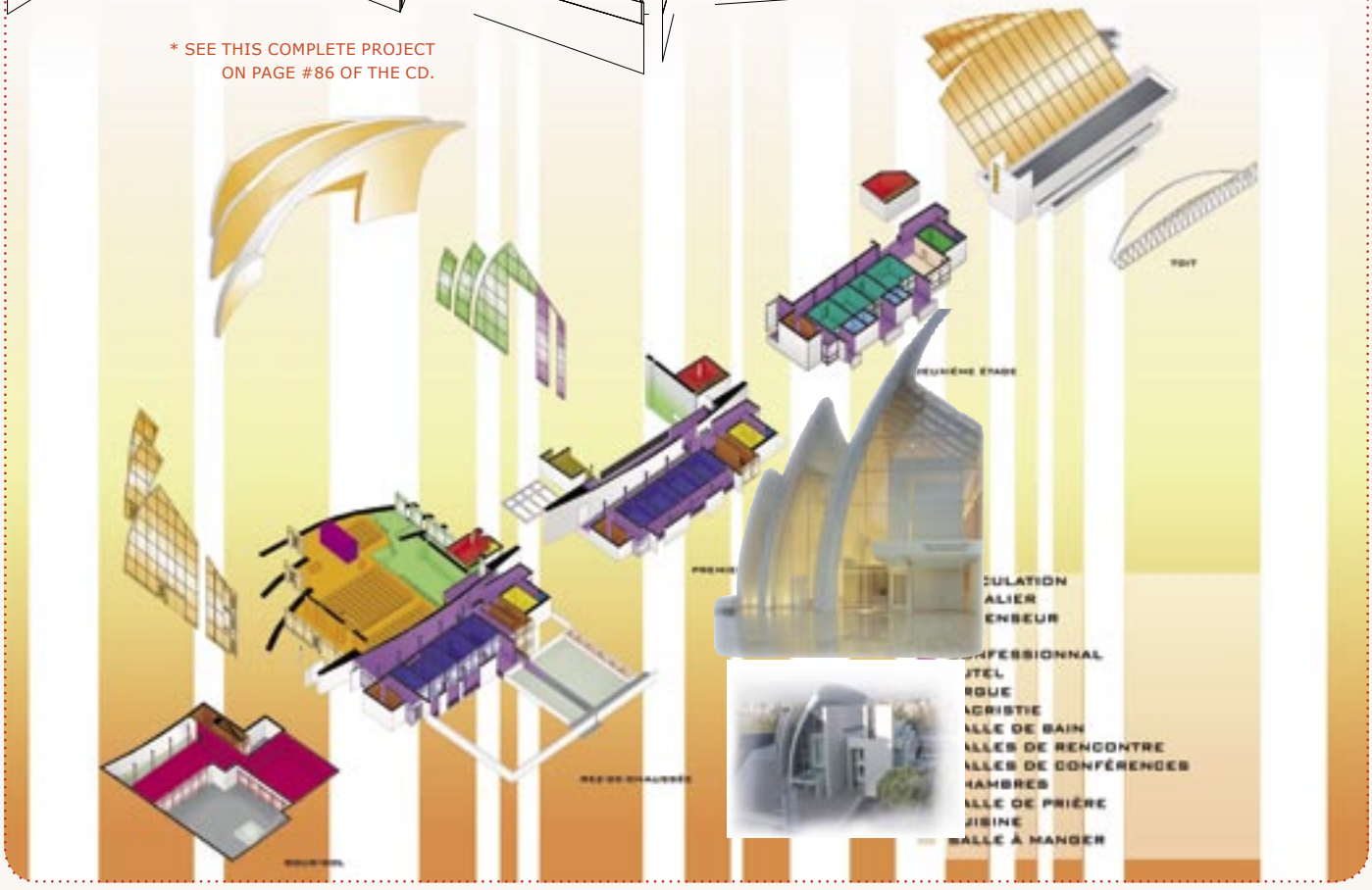
Architectural rendering of the Jubilee Church in Rome (Italy) by architect Richard Meyer.

REASONS FOR THE NOMINATION:

The project has been recreated starting from the architect's preliminary sketches. The 3D project is accurate and presents several difficulties to overcome. Furthermore the **form•Z** animations and the still Photoshop renderings are really good. A very good example of the application's possibilities, the whole project (3D, plans, renderings - traditional & digital - plus the 3D model) has been realized in 9 days by a team of 5 students.



* SEE THIS COMPLETE PROJECT ON PAGE #86 OF THE CD.



Dan Tesene

SENIOR, ADVANCED SCULPTURE / OBJECT AND THE COMPUTER

Manual Fractals: Fossils

ADVISOR/PRINCIPAL INVESTIGATOR: BRAD JIRKA

DEPARTMENT OF FINE ARTS
THE MINNEAPOLIS COLLEGE OF ART AND DESIGN
MINNEAPOLIS, MINNESOTA

SUMMARY DESCRIPTION OF PROJECT:

This project focused on the concepts of multiples, repetition, sequence and rhythm. As an artist using **form•Z** this student approached the new experience with the idea of exploring the media and process rather than simply utilizing it as a visualization or design tool.

The results were the creation of a series of objects, "Teseneossils", that imply fractal forms but were created without algorithmic formula. An artists look at the complexity of systems and nature.

REASONS FOR THE NOMINATION:

This work, developed over the course of two semesters, and recognized by receiving the Senior Fine Arts Award, reflectS a true artist's incorporation of a new media. Seeing beyond the typical application of 3D modeling to a true means for creation and expression, the student utilized **form•Z** outside of the technical realm and, in conjunction with our rapid prototyper, was able to create astoundingly intimate works that ply the realm of fossil, artifact, nature, and technology.

It was interesting to listen to our algorithmic artists describe the importance of the modern artist having the skills of the programer then their response when they learned the works were, essentially, "made by hand".

I believe the work speaks to the delicate balance between the individual and technology.

JURY COMMENTS:

Manual Fractals: Fossils is a very exciting project, underscoring the future direction of 3D modeling by highlighting the power of rapid prototyping. While form•Z is a phenomenal tool for rendering and creating images and animations, the long-term implications of the program is not in pretty images, but in rapid prototyping of any object you can conceive. This project displays the excitement of this important direction in 3D modeling.

- **David Wolf**

The fractal forms of nature and their corresponding urban iterations show the strength of form•Z as a tool for exploratory design and analysis. Continuing the exploration of these fractal pathways using 3D prototyping allows the designer an additional path of design investigation that would be complex to achieve through traditional methodology.

- **Greg Conyngham**

* SEE ALSO PAGE #73.

JUNIOR, FURNITURE & SCULPTURE / OBJECT AND THE COMPUTER

Jesse Gantenbein

Shanty Town

DEPARTMENT OF FINE ARTS
THE MINNEAPOLIS COLLEGE OF ART AND DESIGN
MINNEAPOLIS, MINNESOTA

ADVISOR/PRINCIPAL INVESTIGATOR: BRAD JIRKA

SUMMARY DESCRIPTION OF PROJECT:

This nomination is about the translation of the digital to the real. The exciting element of the use of **form•Z** and rapid prototyping is the adoption of the process as a tool in the creation of the work.

"ShantyTown" contrasts the stark realities of the existence of many populations to the advantages and opportunities of his/her own computer generation. At the same time the work brings an interesting perspective on the generation of "computer architecture", a glance at materials, and an almost ironic humor of the contrast of these differing realities.

* SEE ALSO PAGE #72

REASONS FOR THE NOMINATION:

I feel that this work is a model for the inclusion of the computer and the use of **form•Z** as an effective tool in the artist's creative process.

I feel the project goes far behind the simple use of a machine to become a commentary on modern technology...not a statement of "good or evil" but rather revealing an understanding of the detachment of technology without the "human heart". At the same time it quips at the "glory" of modern architecture while suggesting the application of the technology to more immediate priorities including sustenance and sustainability.

Jury Comments:

This project proposes an intricate and innovative solution to a difficult design problem. It exhibits the proper coupling of digital and traditional media with implications beyond just representation. I was particularly impressed by the multidimensional transfer of media and the resultant iterations of the designed artifact.

- **Loukas Kalisperis**

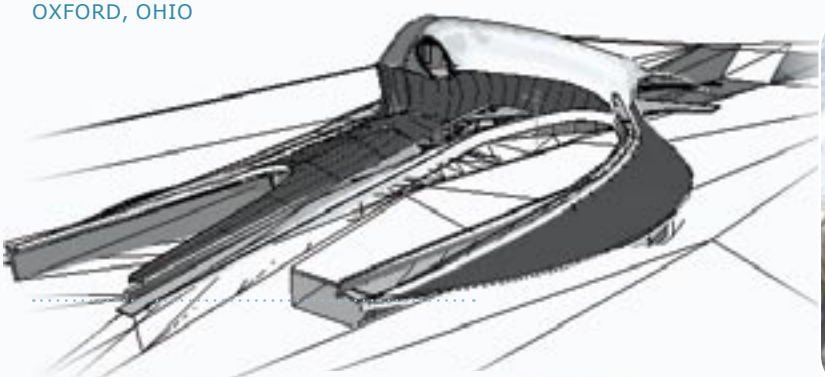
JUNIOR/SENIOR, ARCHITECTURAL DESIGN STUDIO

James Diewald, Jon Pietro, and Mike Rudelphsen

Boathouse at Montrose Harbor

DEPARTMENT OF ARCHITECTURE AND INTERIOR DESIGN
MIAMI UNIVERSITY
OXFORD, OHIO

ADVISOR/PRINCIPAL INVESTIGATOR: MURALI PARANANDI



JURY COMMENTS:

It is very rare that I see good and meaningful camera movements, transitions and effects in a student project; however, in this endeavor the digital cinematography techniques are excellent. This project exhibits an elegant use of media to comprehensively present and explain the design proposal and the designer's intention at all design stages.

• **Loukas Kalisperis**

* SEE THIS COMPLETE PROJECT ON PAGE #79.
PLAY THE MOVIE FROM PAGE #158 OF THE CD.

This animation uses a variety of digital visualization tools to fully explain the complete structure, program, spatial characteristics, materials and details. It shows the building as a design presentation and yet also forms a "construction document" to further clarify the full extent of the design.

• **Greg Conyngham**

Adam Doulgerakis, Miltos Portokalis and Aris Theofilou

9TH SEMESTER, NEW MEDIA IN ENHANCING PERCEPTION OF SPACE

Escape from Modern Tate

ADVISOR/INSTRUCTOR: ANASTASIA PECHLIVANIDOU-LIAKATA, STELIOS ZEREFOS, AND TINA MIKROU
PRINCIPAL INVESTIGATOR: ANASTASIA PECHLIVANIDOU-LIAKATA

SCHOOL OF ARCHITECTURE
NATIONAL TECHNICAL UNIVERSITY OF ATHENS,
ATHENS, GREECE

JURY COMMENTS:

While the modeling and textures are rather basic, the animation itself is very good–using strictly **form•Z** animation capabilities. "Escape from Modern Tate" explains it all, as it asks a question: where is Lara Croft? These students use the camera as if they were doing a movie with modern techniques: with a camera on a shoulder at eye level, walking, running, and stopping to decide whether to run away. There is a very acute sense of rhythm in the scenario. Looking at the animation, you are really involved and you are waiting to see what happens next! Also, the music integration is perfect. This is an apparently very simple (but in fact not that simple) animation in **form•Z** with a lot of sensibility!

• **Christian Allebosch**

* SEE ALSO PAGE #180 OF THE CD, FROM WHERE YOU CAN PLAY THE MOVIE

Danny Salomon

ADVANCED ARCHITECTURE

le Corbuseir's Domino House

ADVISOR/PRINCIPAL INVESTIGATOR: ROBERT MEREDITH

ART DEPARTMENT
DALTON SCHOOL,
NEW YORK, NEW YORK

SUMMARY DESCRIPTION OF PROJECT:

For the past few years I have refined an assignment based on le Corbusier's Domino house. Students are given a **form•Z** model of the Domino structure and asked to consider le Corbusier's 5 points of Architecture (1. Internal supports; 2. Free plan; 3. Horizontal windows; 4 The free design of the façade; 5. The roof garden). Students are asked to use the Domino model as a catalyst for their own ideas regarding architecture. In this assignment, students seem to both accept and use the 5-point concept to explore the freedom inherent in such a model, or they ignore the structure and camouflage the skeleton.

REASONS FOR THE NOMINATION:

I have recommended this student for this year's Award of Distinction because of his ability to utilize the le Corbusier model by building on the 5 points that develop a strategy for a house. This student has consistently developed modeling skills, and possesses an intelligent sense of design. His attention to detail and specificity in all the elements make this project come to life.

JURY COMMENTS:

The project exhibits a sensitive and compelling representation of materiality, structure, and system. The play of solid and void, transparency and opacity, adds to the understanding of the viewer. The comprehensive representation and level of detail places the design in context.

- **Loukas Kalisperis**

A very firm grasp of modeling and rendering shows great promise in what the next generation of designers will be capable of. Commendable work!

- **David Wolfe**

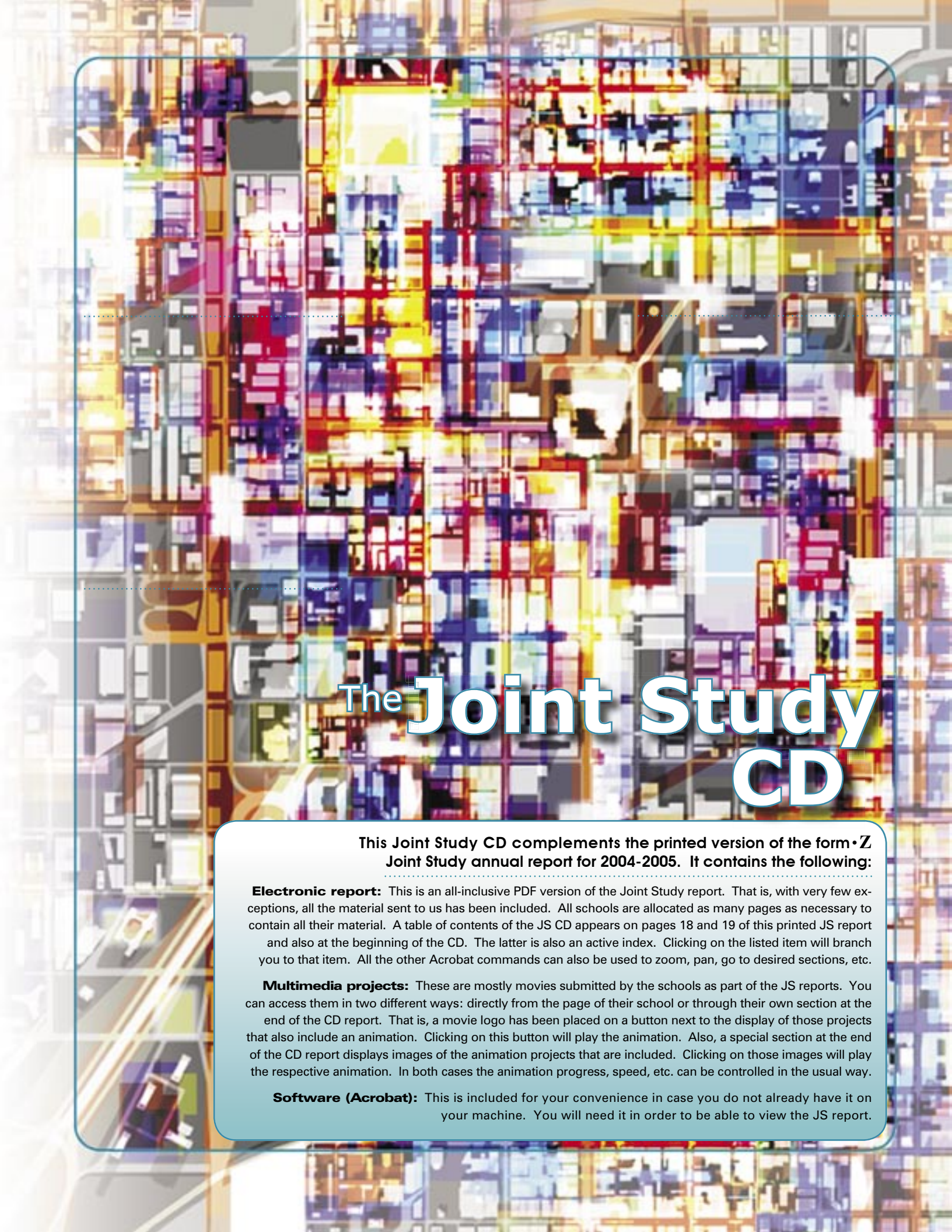
For a high school student – really good work. Architecture is evident from any view. Modeling is clear and well rendered. The interior renderings are of a quality far beyond a high school student's capabilities.

- **Christian Allebosch**

This model of le Corbusier's Domino house shows the use of digital tools to provide an understanding of design and tectonic concepts of the architect's core points of design. The interior renderings give us a further glimpse of how these points shape the finished volumes for the purpose of the home's habitants.

- **Greg Conyngham**

* SEE ALSO PAGE #551 OF THE CD.



The Joint Study CD

This Joint Study CD complements the printed version of the form•Z Joint Study annual report for 2004-2005. It contains the following:

Electronic report: This is an all-inclusive PDF version of the Joint Study report. That is, with very few exceptions, all the material sent to us has been included. All schools are allocated as many pages as necessary to contain all their material. A table of contents of the JS CD appears on pages 18 and 19 of this printed JS report and also at the beginning of the CD. The latter is also an active index. Clicking on the listed item will branch you to that item. All the other Acrobat commands can also be used to zoom, pan, go to desired sections, etc.

Multimedia projects: These are mostly movies submitted by the schools as part of the JS reports. You can access them in two different ways: directly from the page of their school or through their own section at the end of the CD report. That is, a movie logo has been placed on a button next to the display of those projects that also include an animation. Clicking on this button will play the animation. Also, a special section at the end of the CD report displays images of the animation projects that are included. Clicking on those images will play the respective animation. In both cases the animation progress, speed, etc. can be controlled in the usual way.

Software (Acrobat): This is included for your convenience in case you do not already have it on your machine. You will need it in order to be able to view the JS report.

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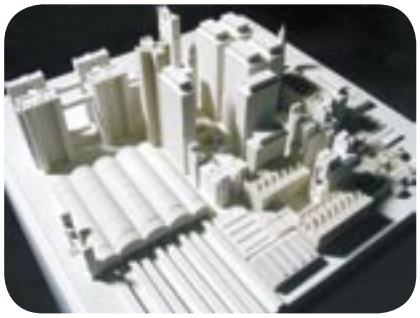
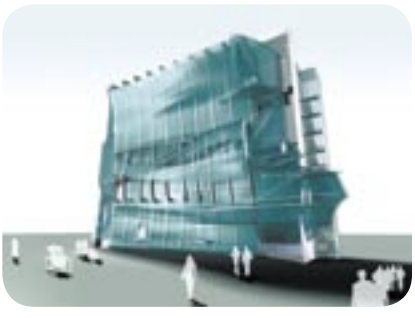
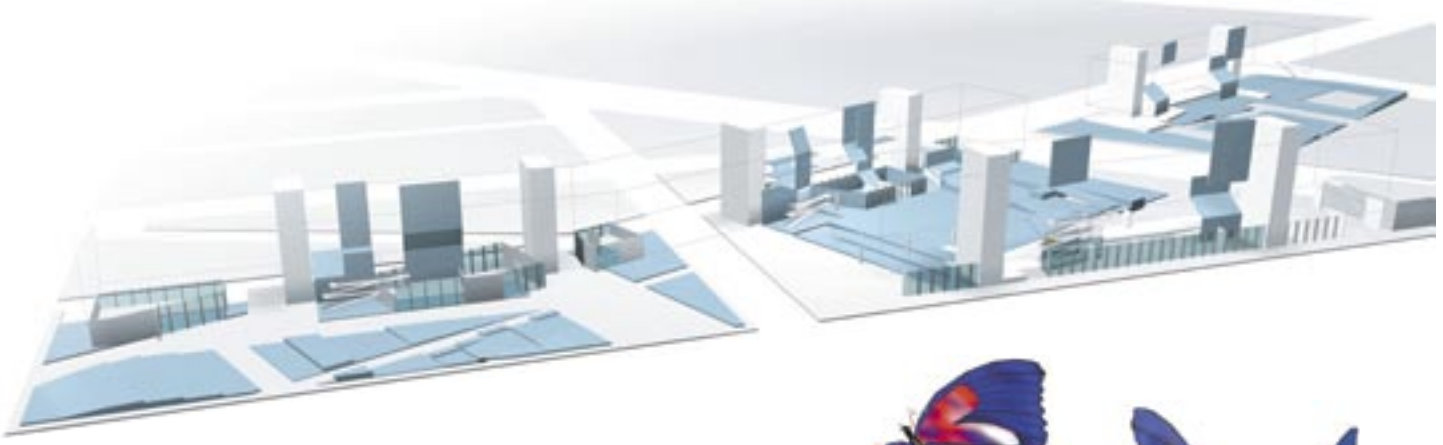






Interior Design

Urban and Landscape Design

Product and Industrial Design

Visualization and Illustration

High Schools

Some Notes on the Production of Digital Form

School of Architecture and Design
AMERICAN UNIVERSITY OF SHARJAH
Sharjah, United Arab Emirates

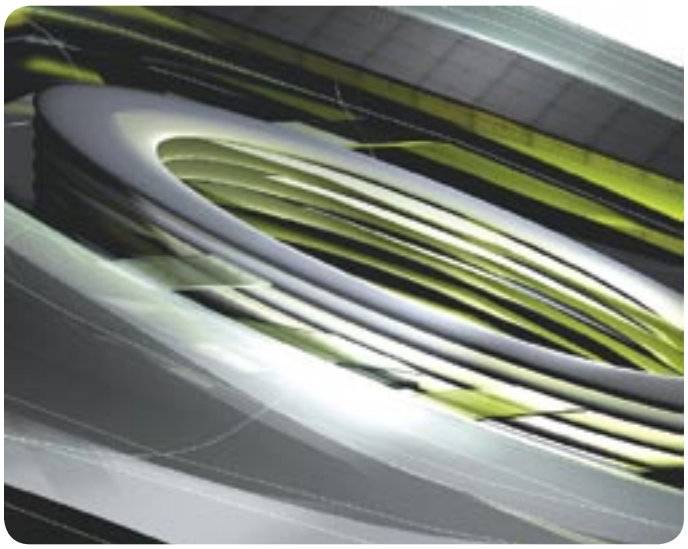
BY GEORGE KATODRYTIS, ASSISTANT PROFESSOR

The modeling abstract machine

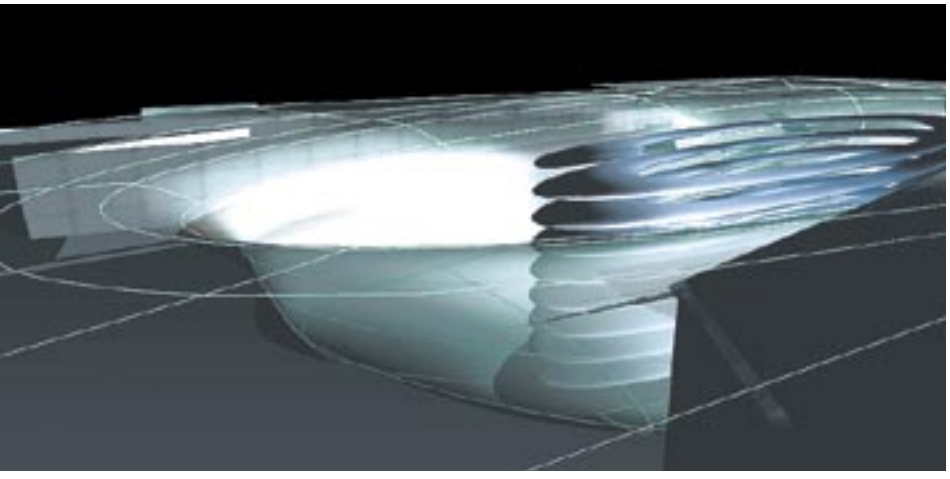
Space is never universal, but subjective. Furthermore, computer-aided design in architecture has manufactured a new and uncanny digital realm. The medium of digital representation is also a medium of invention. New territories, unthinkable a decade ago, are now fabricated, and the boundaries of organic and inorganic are blurred. The emergence of digital forms requires a new grammar for reading and understanding.

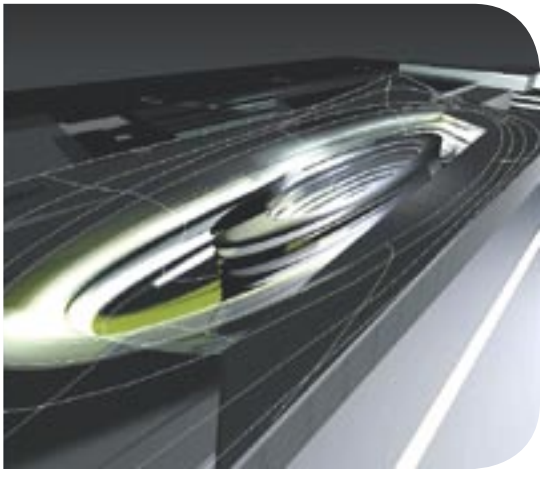
During this process, the initial stage of play and proliferation has to be followed by the tenacious work of selection and interpretation. The addiction with the promise of novelty has become the new reality. Technology is inextricably linked to our contemporary condition. According to Benjamin, the aesthetic experience consisted of keeping defamiliarization alive, as contrasted to its opposite–familiarization and security. This "weakening" of architecture, has altered the relationship between structure/image and structure/skin.

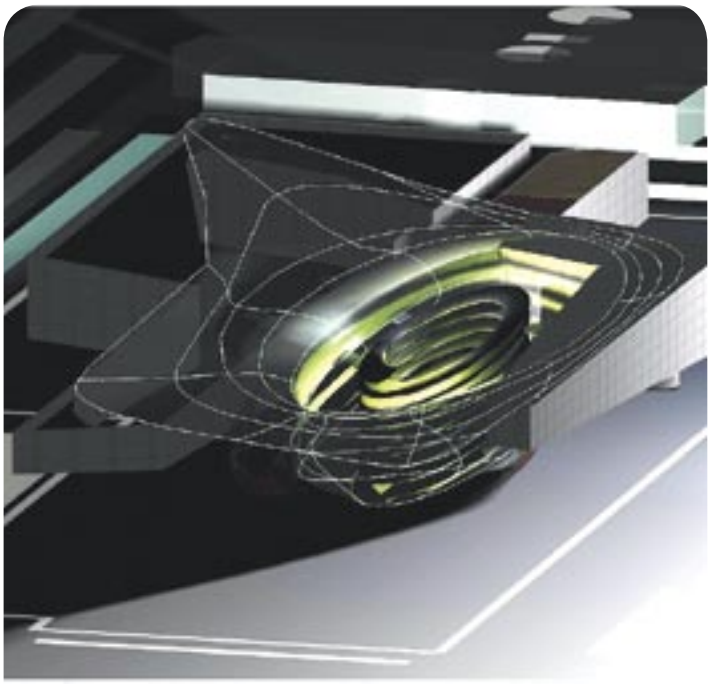
It is interesting to debate that which is always discussed in architectural circles, namely, structure versus ornament. Since the Renaissance, architectural theory has always distinguished between structure and ornament, and has set forth the hierarchy between them. In contemporary discourse, this dichotomy has been eliminated. One can unleash within a digital environment a population of virtual desires that varies from the beautiful to the grotesque. The new tools of topological procedures allow operations such as stretching without tearing, folding without gluing, and preserve only a set of very abstract invariant properties.

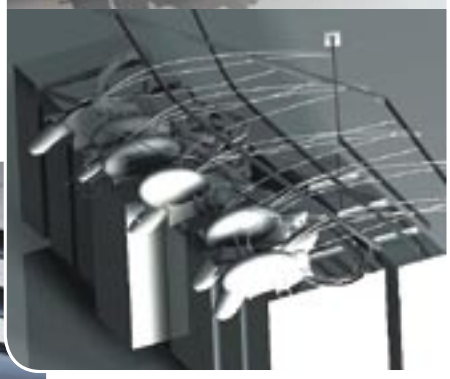


At a larger scale, this generates the development of an urban environment as a dynamic space of flows and 'smart' zones, where continuous topological surfaces connect exterior and interior spaces, functional programs and infrastructures. The emphasis of the exploration is for morphological complexity whereby the construction and selection of rules that produce specific effects is motivated by aesthetic and plastic sensibilities. For the first time, architecture is genuinely searching for complexity of this formal type in order to keep in touch to that of the city, of the networks and systems, the intricacy of culture, and the vagueness of globalization.









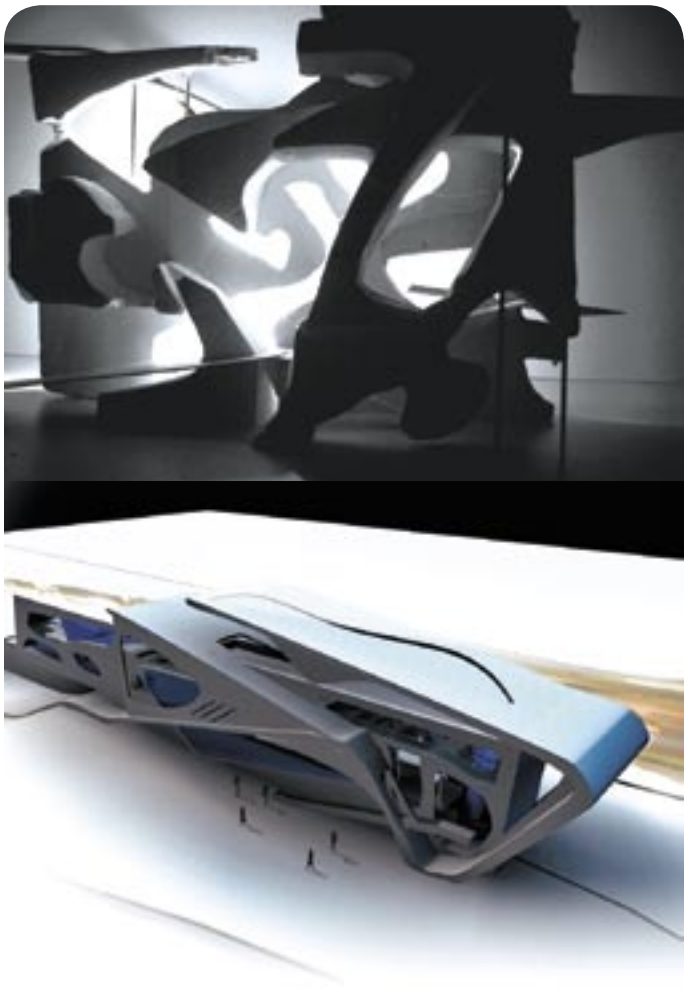
GEORGE KATODRYTIS
Abstract Machine

Replicas Museum in Dubai, United Arab Emirates

School of Architecture and Design
AMERICAN UNIVERSITY OF SHARJAH
Sharjah, United Arab Emirates

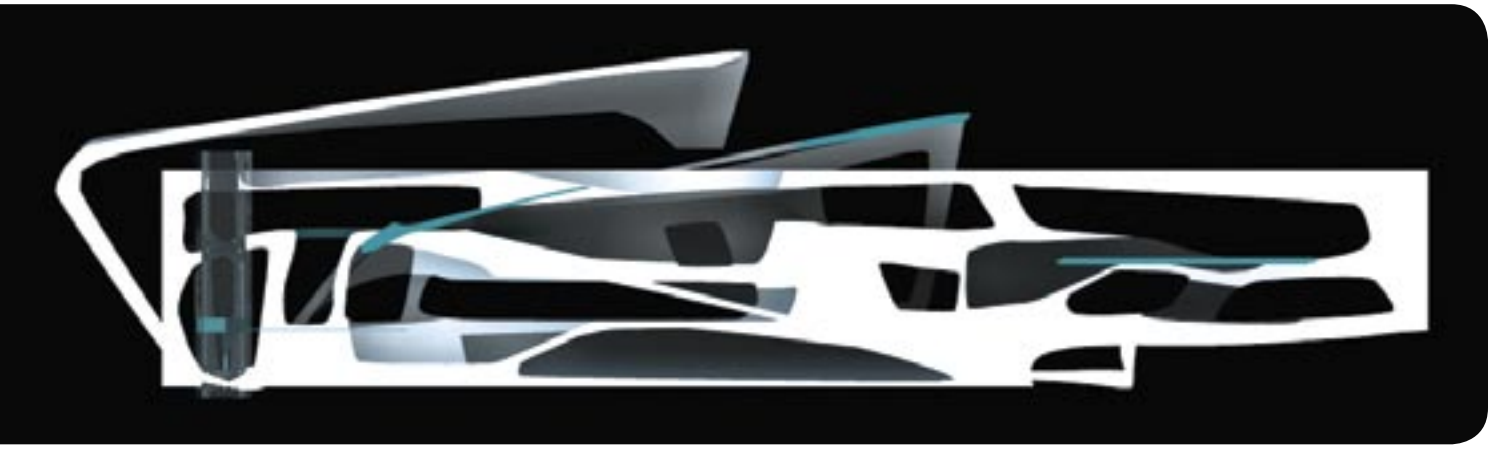
BY TAMER FAWZY, FIFTH YEAR
INSTRUCTOR: GEORGE KATODRYTIS, ASSISTANT PROFESSOR

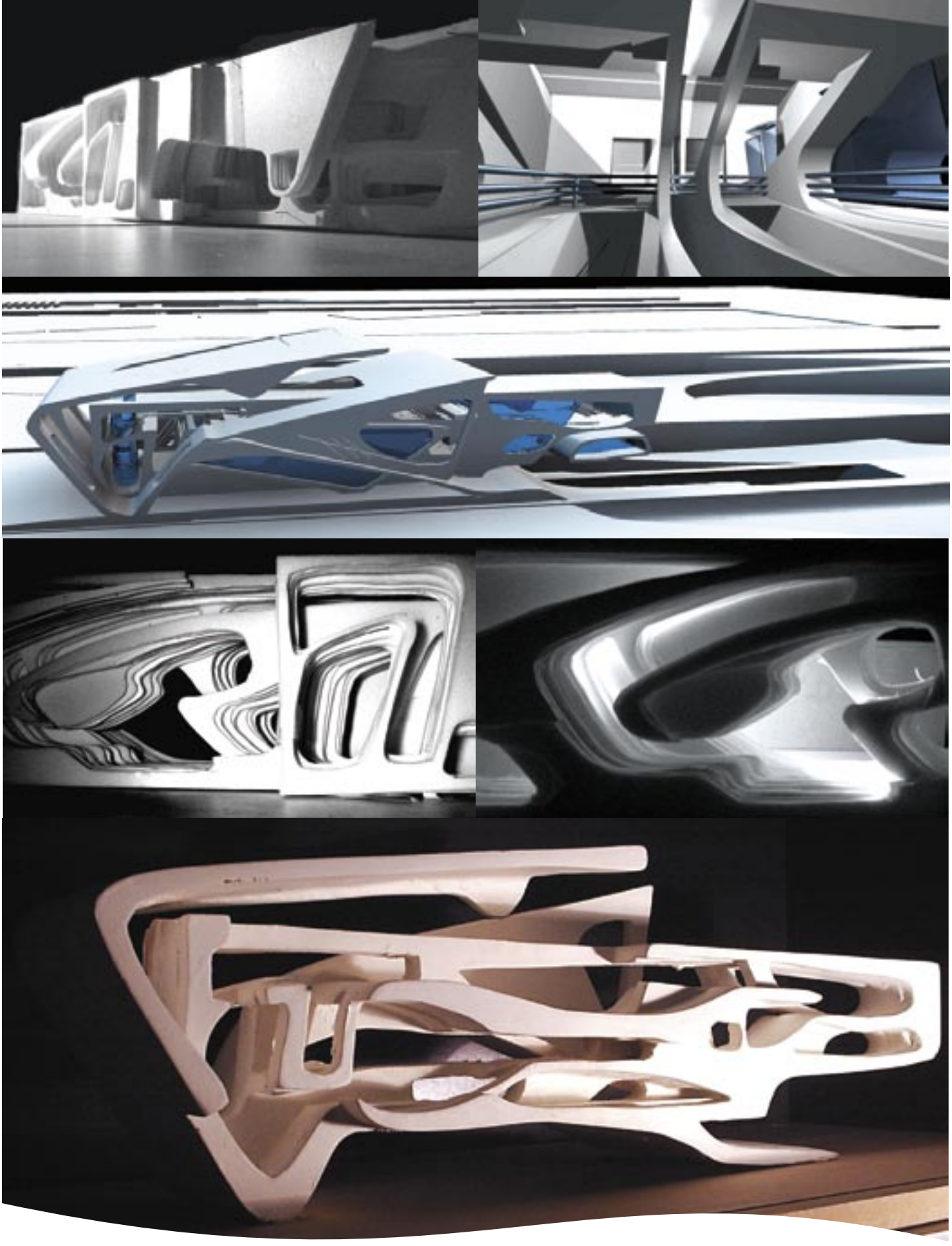
The proposal is for a Replicas Museum, located near a highway on the outskirts of Dubai, in the United Arab Emirates. The design process started by exploring techniques of casting as the production of form, which imitates and fabricates variations, especially the relationship between a mould or even a flexible mould and its cast. Such process involves the reciprocal relationship of solid vs. void, positive vs. negative space, and ultimately the loss of authenticity in a contemporary culture of counterfeits and imitations. With the development of computer and visualization technologies, simulation becomes the major tool in the exploration of form making and the dramatic transition in the loss of authenticity: the multiple imitation of the formal language of architecture.



In this project, the process of molding plaster was developed parallel to simulating its formal variation using **form•Z**. The project established a sequence of both precise and intuitive techniques. Sections of thin strips of casts were fabricated, each one with a variation, and then assembled adjacent to each other. The result was a series of unpredictable spaces, which were developed as programmatic encounters and made up the interior for a Replicas Museum. In parallel to this, the digital counterfeit process allowed for topological variations, such as stretching, bending and deforming.

The result is a new prototype building, which was then situated on a flat and "fast" site, near a highway, becoming a floating three-dimensional billboard. This was set against the mirage of the romantic yet unfriendly desert in the nomadic and dynamic city of Dubai. What is more, the interior demonstrates a "slow" pace as users are trapped and delayed in fragmented enclosures.





A Town Landmark for Morelia, Michoacan, Mexico

Department of Architecture
CALIFORNIA POLYTECHNIC STATE UNIVERSITY
San Luis Obispo, California

BY HUGO MARTINEZ, FOURTH YEAR
ADVISOR: THOMAS FOWLER, ASSOCIATE PROFESSOR

CONCEPT

My design concept for the city of Morelia, Michoacan in Mexico was developed from a fusion of necessity and hope for the future. The history of Morelia is very much intertwined with the development of a historic aqueduct system built in the 1500s. My architectural response was developed in two parts, the first was the development of an elevated linear park using the path set by the historical aqueduct. This provides a physical connection between the southern parts of the city to the more developed downtown square. The second element is a viewing tower that will provide a vantage point for seeing these paths of history. The viewing tower soars over the city's skyline allowing visitors to have a visual connection with the entire city. This view provides the hope and inspiration to set forward an understanding of how it is best to develop the city beyond its current boundaries. The materials used for this new structure are meant to be in contrast to the materials of the historic aqueduct.

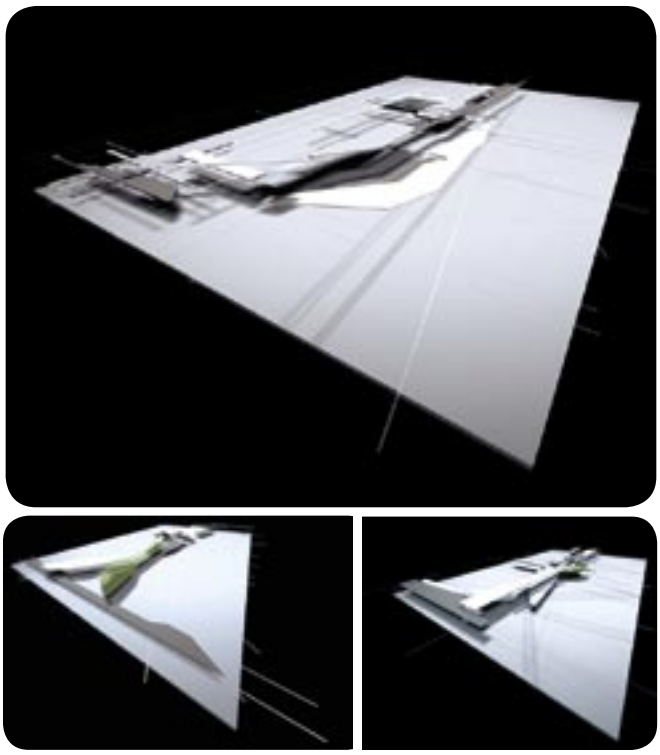
SITE ANALYSIS

form•Z was an essential tool for developing the dissection analysis strategy for understanding the complicated set of infrastructure systems that make up the modern city of Morelia. A series of analog diagrammatic, collage, and relief models studies were developed. With **form•Z** the analog studies were morphed into digital reliefs and perspectives and provided a framework for designing the architectural vocabulary for the linear park and viewing tower.

The project itself started developing by the forces of the city captured in digital form. The experimentation with digital diagrams provided the foundation for the expression that needed to be part of the final architecture. **form•Z** provided the ground on developing this idea as it created a dynamic in layering effects that started to generate opportunities for spaces at different levels in interesting dynamic shapes that backed up the original concept. Creating a digital layering effect presented almost endless possibilities for new architecture to be developed as it interacted with the city. **form•Z** provided a quick way to generate a variety of composite diagrams for creating a language on which to base the project design.

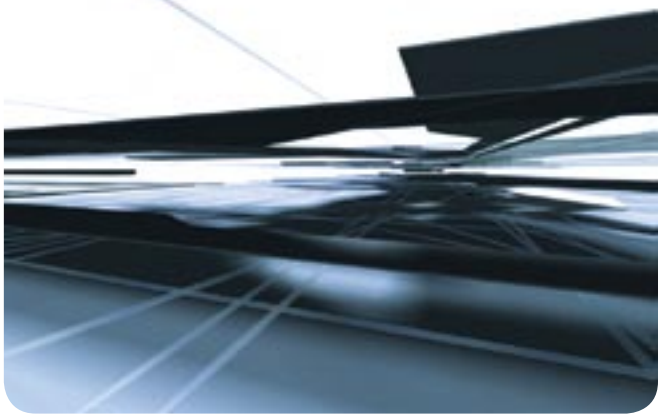
ARCHITECTURAL VOCABULARY DEVELOPMENT

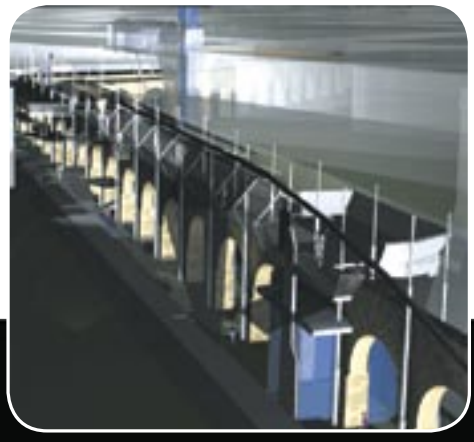
After dissecting the city through a series of diagrammatic studies using **form•Z**, the design of the elevated linear park and tower became a way to provide linkages to the fragmented city. It was important that the new architecture not overpower the existing conditions of the place or impose a static program that did not allow a freedom of movement and transparency. The intention of the elevated park was to create a more personal interaction with the city in a series of spaces that would allow viewing of the city at different levels.

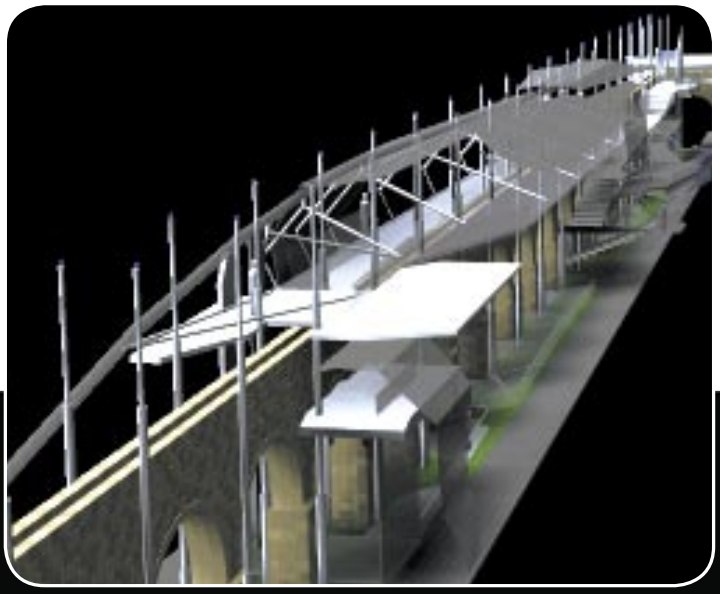


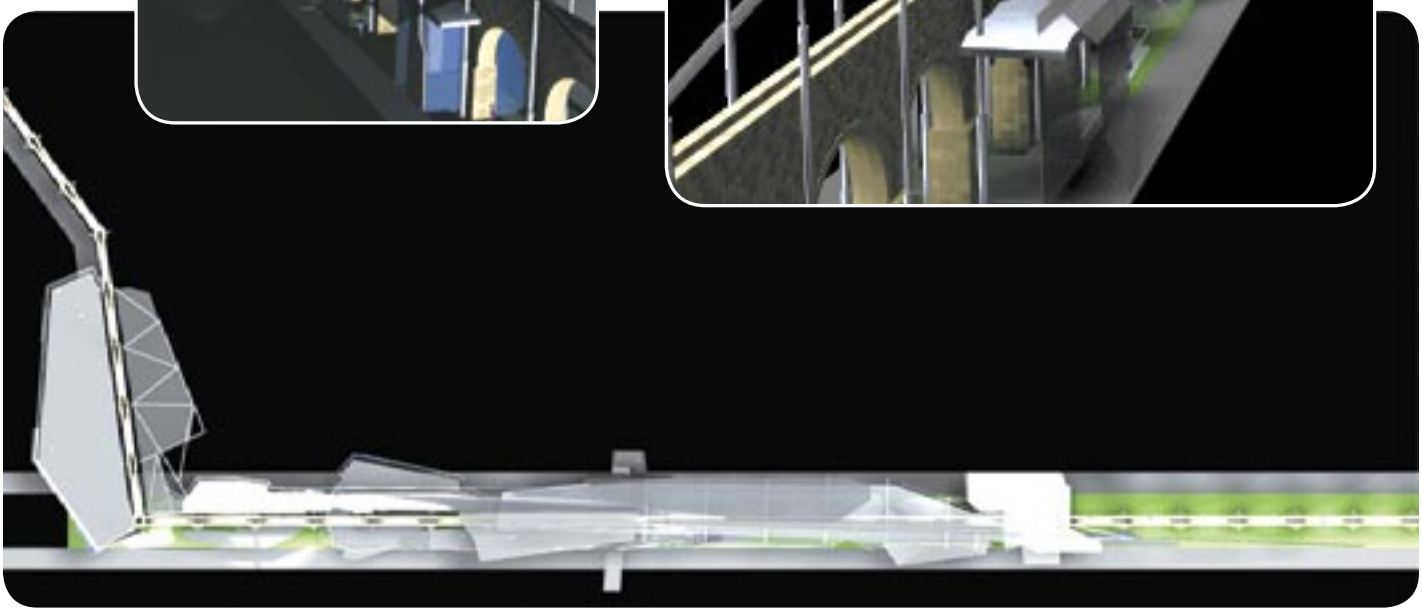
CONCLUSION

The use of **form•Z** as the digital studio design tool opened infinite windows of possibilities that allowed the design to be pushed to limits never seen before and allowed the design process to test different horizons. In exploring my design concept with **form•Z**, I was able to work much faster then in any media and develop my project along the lines of my initial analysis. **form•Z** was used in part as the main design tool and other times as a complementary tool to other traditional design strategies, but it was always an important part of the design process.









Department of Architecture
CALIFORNIA POLYTECHNIC STATE UNIVERSITY
San Luis Obispo, California

A Tsunami Memorial

HONORABLE MENTION IN ARCHITECTURAL DESIGN

ALSO SEE PAGE #5.

BY JACOB AFTRETH, THIRD YEAR
ADVISOR: THOMAS FOWLER, ASSOCIATE PROFESSOR

A Project memorial was designed in response to the tsunami that devastated Southeast Asia on December 16th 2004. In the aftermath of the tsunami many thousands of people's lives were fractured and broken. In Banda Arceh, Indonesia there was a river of moving debris from the destruction caused by the tsunami. Within the debris were hundreds of victims the tsunami had claimed.

The tsunami memorial with fractured forms and spaces ("Fractures" became the concept for my project), attempts to capture the feeling of the destruction and loss the tsunami caused. The multi use program called for reading rooms, a café, administration offices, a conference room, and restrooms, along with a grand memorial space. The play of light through the translucent laminated glass elements and different reflectances on interior surfaces creates a unique experience for the visitor. The structure of the memorial is constructed with compression members and tension cables in a seemingly random configuration. The grand space is composed of a series of passageways and a large staircase with large sculptural elements created from the debris created by the tsunami.

During the design development process for my project's architectural vocabulary I used both digital and analog media. Switching back and forth between these two media helped me to develop the project. Each media has its strengths and weaknesses. Working with analog models and drawings allowed me to develop irregular forms and spaces quickly and then develop and refine the models digitally. **form•Z** was great for developing the immersive views of spaces and for quick generation of section cuts and plans.

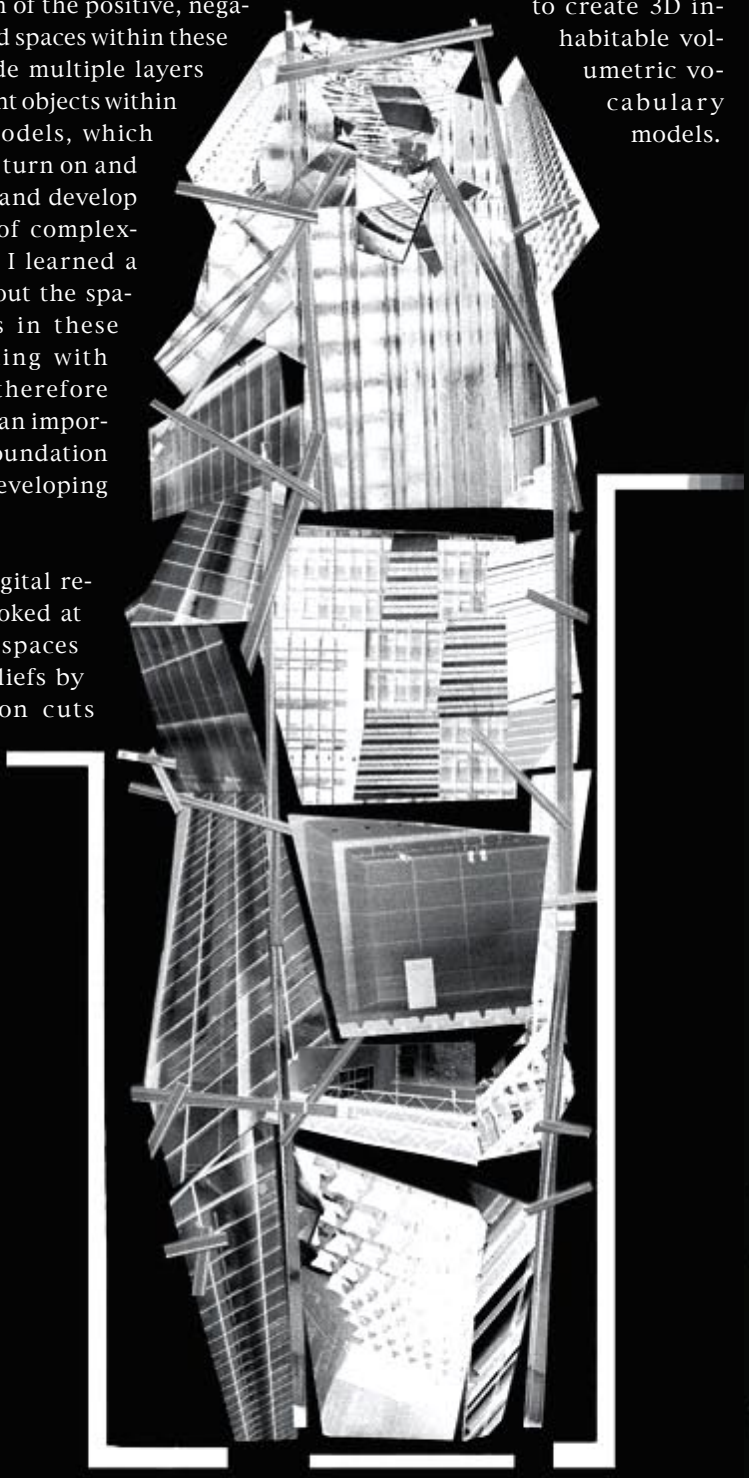
form•Z Experience

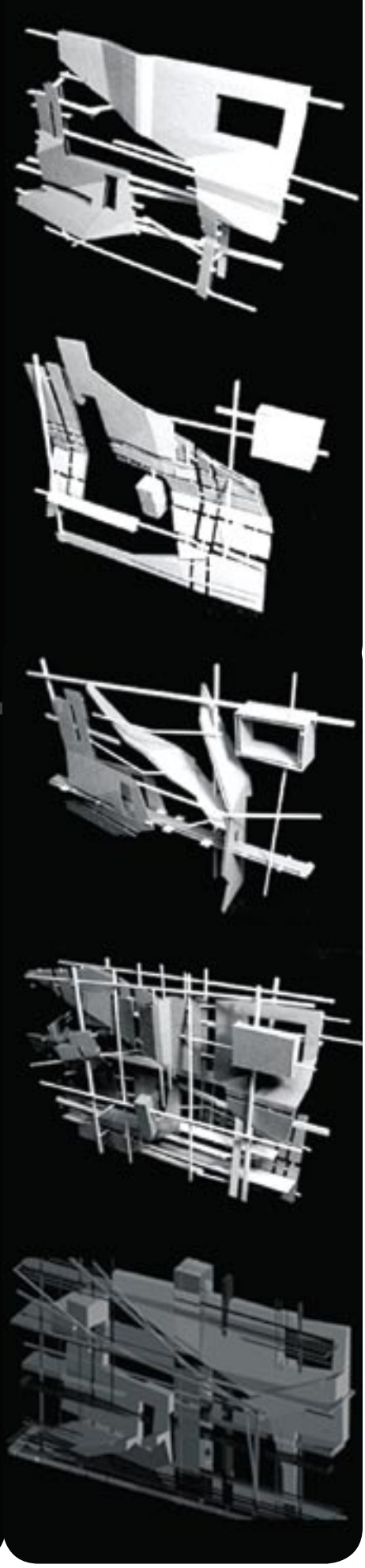
I had very little experience with **form•Z** (except for an introductory class I took in Fall '03) before taking Professor Fowler's Third Year Architecture Design Studio. I learned a great deal about how to use **form•Z** during the process of design for my project. In the beginning of the quarter, Professor Fowler had students work in groups for a week to develop a project using diagrams and generating relief models. After this group project, I had a good foundation for using **form•Z** to approach the design of my project. I only used three commands in **form•Z** (move, difference, and rotate) for a great deal of my project. Also, while in groups we studied and analyzed a detail of a double skin building. We created a large-scale model of the detail, which we also modeled digitally, and this further increased my understanding of skin and structure.

Design Process Start

To start the design process for my project, as a way to sort out my reaction to the Tsunami disaster, I developed many diagrams (e.g., schema, grid, tension, and collage) from layered images in both digital and analog media. From these diagrams I developed a 2D image, which was used to create relief models that were an exploration of the positive, negative and hybrid spaces within these models. I made multiple layers for the different objects within the digital models, which allowed me to turn on and off the layers and develop a high level of complexity of spaces. I learned a great deal about the spatial qualities in these models working with **form•Z**, and therefore this provided an important design foundation for further developing my project.

From these digital reliefs I then looked at the possible spaces within the reliefs by taking section cuts with the clip hither/yon view. Working between positive, negative, and hybrid spatial interpretations from the digital section cuts, I used collage and line drawing techniques to develop over-lays showing spaces, structure and skin. From the sections I went back between the digital and analog reliefs and refined and worked into the models to create 3D inhabitable volumetric vocabulary models.





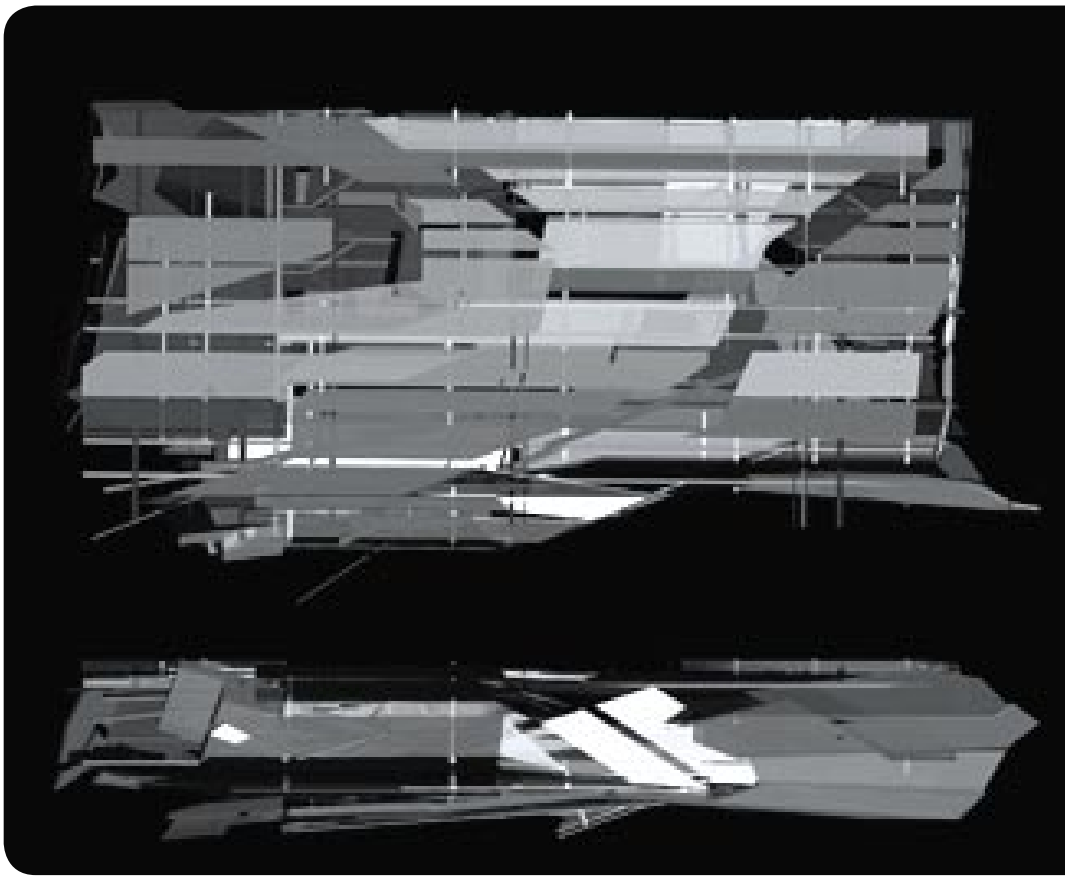
Program Development

Programmed spaces were explored as 3D volumes and developed as 3D inhabitable volumetric models. Spatial adjacency relationships were then explored and analyzed. With **form•Z**, I developed volumetric program models very quickly. With the transparency of the shapes turned on, I was also able to create over lapping spaces. With analog models it was harder for me to develop intersections and connections in the program in an efficient timeline.

With the programmatic volumes defined, I went on to develop and refine the 3D inhabitable volumetric vocabulary models to work with the program. I first worked with an analog model to develop the overall quality of the spaces. Then with the development of my analog model I was able to work into my digital 3D inhabitable volumetric vocabulary model to refine and open up the spaces to fit my program. By continuing to work into my digital models, I was able to refine and keep the richness and complexity of my early vocabulary studies. I also continued to look at the spaces through both cross and longitudinal sections as well as immersive views taken from within the **form•Z** model. Throughout the design process I also looked at the project through a sequence of events, with the help of the animation tool and key frames of **form•Z**, I was able to create multiple short movies, rendered in renderzone at 100 x 150dpi. The low resolution of the movie allowed me to see what was working and what was not without wasting time rendering.

Project Refinements

In the final development of the project I focused on the quality of the interior spaces by studying immersive views of my digital model using **form•Z**. I also developed and refined my circulation so it could be integrated into the double skin of the project. Looking at different layers of the skin in **form•Z** allowed me to see if the circulation was working within the spaces. I explored the use of color, transparency, and textures using **form•Z**'s **RenderZone**. A large-scale cross-section drawing allowed me to further develop and articulate the skin and structure of the building. While developing the skin of my project, it was important to look at all the elevations including the roof in a developmental folded out manner. With each side of the structure facing a different orientation, it provided a great opportunity to create unique solutions to each of the different orientations. These folded out elevations helped me to outfit the envelope to react to the site orientation along with capturing appropriate levels of day lighting.



Project Design Reflections

In Professor Fowler's design studio I learned the process of using **form•Z** as a design tool for "thinking through my hands" (a Malcom McCulllough phrase). By building and creating so many digital and analog models, I developed an architectural vocabulary for my project that was able to evolve over the duration of the quarter. While developing my project the analog models seemed to be what initially drove the design of my project. The digital and analog relief models helped in the development of project's vocabulary model and helped to better simulate the project montaged into the project site. **form•Z** provided me the opportunity to refine and develop my project, even though my **form•Z** skills were not very strong. It seems that in reflecting about my design project, that if I had worked only in a digital media, I would have limited my design to what I could do in **form•Z**. By going back and forth between digital and analog media throughout my design process it forced me to learn new strategies for design as I was working with **form•Z**. All aspects of the process were a development from the original diagrams and relief models that were in response to the Tsunami Disaster.

Interpreting Babel

School of Architecture
CARLETON UNIVERSITY
Ottawa, Ontario, Canada

BY JAMES HAYES, THESIS YEAR, MASTER OF ARCHITECTURE
AND MICHAEL JEMTRUD, ASSOCIATE PROFESSOR

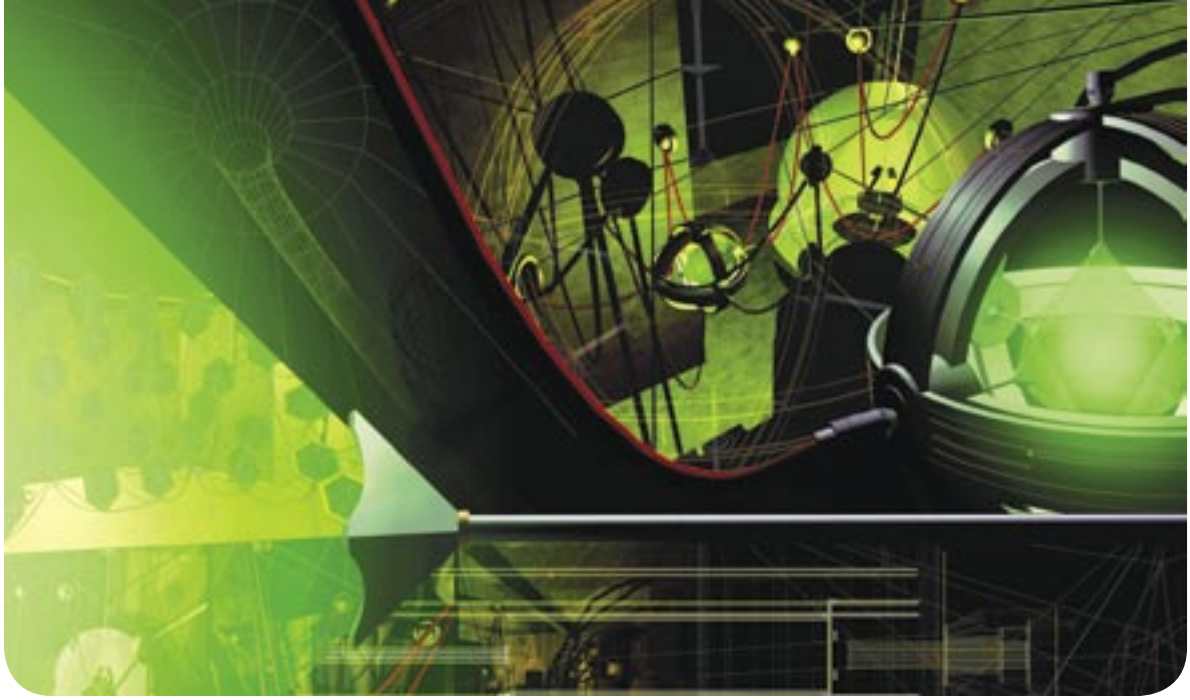
ESMOND LEE AND DAVID FLETT

As the first digital media course in the curriculum, the following project was designed to introduce and develop proficiency in **form•Z** while discussing theoretical questions of the legacy of modern representational devices of perspective, axonometry, and orthography as those modes that ground digital modeling applications.

The project began with a reading of "Library of Babel" from Jorge Luis Borges. The site was the reading room in the school of architecture. The students were asked to consider three primary threshold conditions of entry, gathering, interface (book and computer). They were asked to think in terms of basic architectural and tectonic issues such as surface, structure, light, threshold, etc. The project was the second in a series that tasked the students with creating an intervention in a three-dimensional model of an existing space within the School of Architecture, in this case the Reading Room. The threshold conditions related to four different areas within the Reading Room model, with one of the four areas being assigned to each pairing of students.

For the first phase of the project, the challenge was to inhabit a programmatic and spatial area of the Reading Room inspired by the story. The scale and level of detail of each investigation considered what Jose Oubrerie in "Architecture before Geometry, or the Primacy of the Imagination" claims to be one of three major shifts in architecture as:

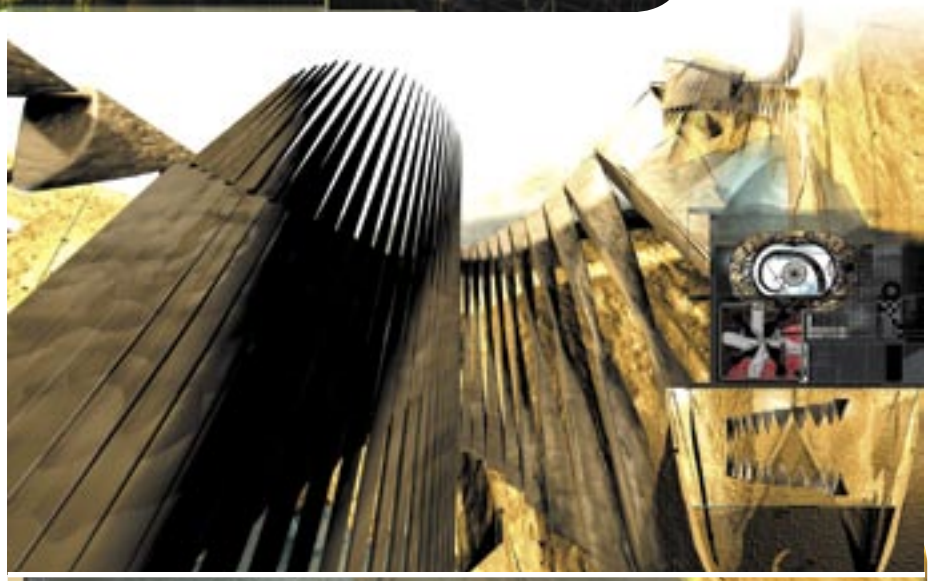
> *"... the abandonment of the human scale as a referent, a dimensional generator, in architectural creation. The anthropomorphic relationship has been superseded by a more psychological and perceptual one that addresses more the body's senses than its physical presence."*

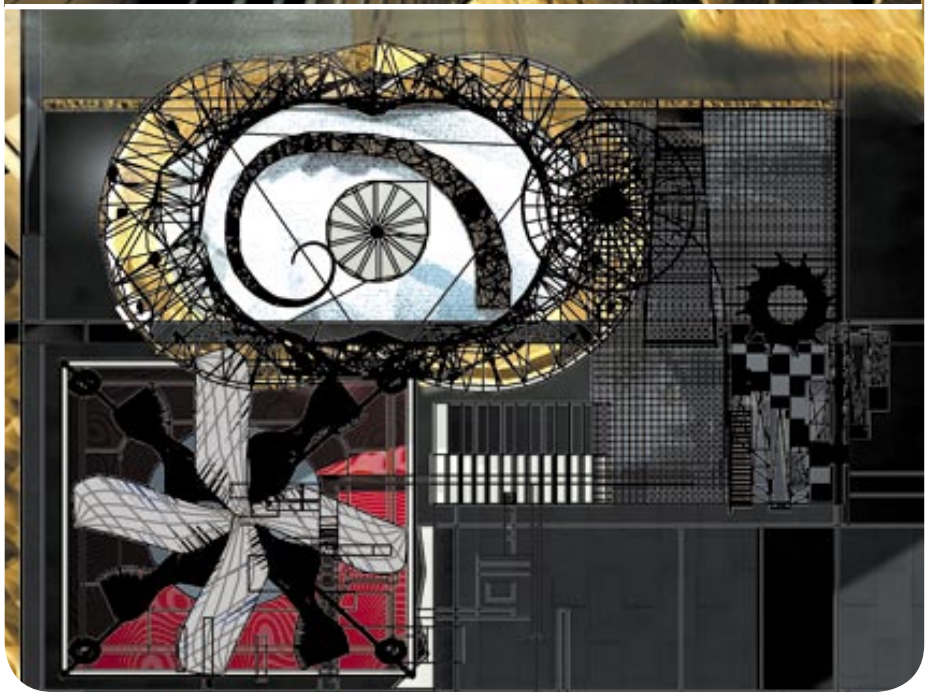


KATELYN WURTS
AND
BENOIT PERRAULT

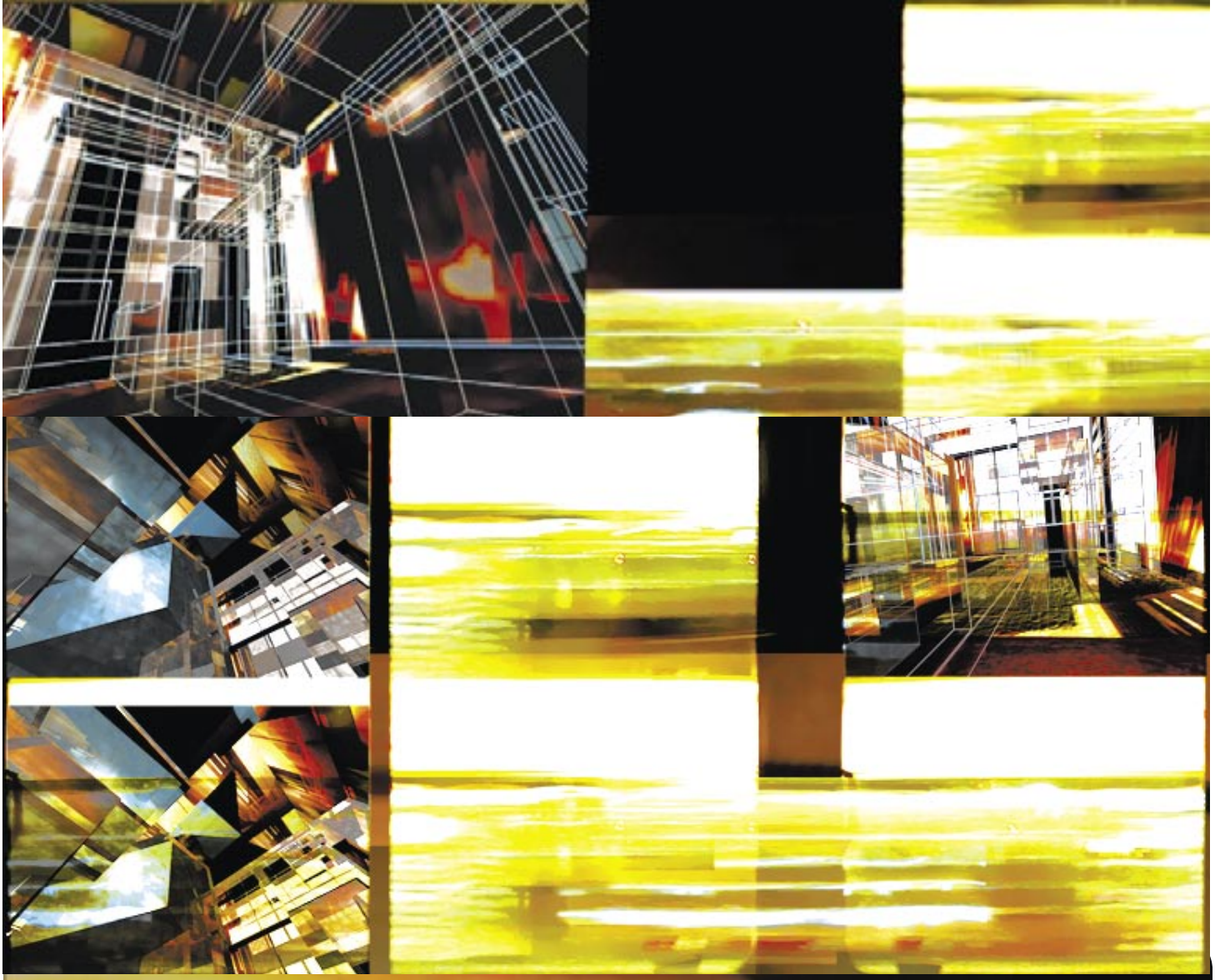
Students were required to "read the situation" and respond to the given context (theoretical, physical, programmatic, etc.) in situ thus intentionally engaging the tool in all its complexity. **form•Z** was engaged in a speculative manner as a tool for the designer to investigate ideas and allow for the development of a design or idea in a similar fashion to the traditional methods of the pencil and the physical model.

The first phase was an exercise that required a sophisticated response to the situation by the students and simultaneously served as an introduction to the modeling, texturing, lighting and static rendering tools of **form•Z**. The first phase concluded at midterm with a presentation and discussion of each pairing's panel.





RICHARD GURNHAM



For the second phase **form•Z** was used as a time-based dynamic medium, introducing the students to the camera animation functions of **form•Z**. Three additional student projects were added to the Reading Room model adding to the complexity of the project. The students were required to refine their own model, while responding creatively to the three new additions to the space.

The conclusion of the second phase was an animation that explored the spatial relationships of the Reading Room through light, motion, and sound. Students were encouraged to explore the manifold render styles of **form•Z** (Wire Frame, Quick Paint, RenderZone) in crafting and compositing richly layered renderings and animations.

The responses by the students ranged from ephemeral ghostly projects to meticulously detailed models to tactile textural models. The diversity within the student projects speaks to the versatility of **form•Z** as a design tool and the ability of the user to create projects that reflect intentionality and uniqueness in the creation of digital artifacts often not apparent in digital renderings.

AVIS YAU AND KARIN CHOW

College of Architecture
GEORGIA INSTITUTE OF TECHNOLOGY
Atlanta, Georgia

[n]DM: Networked Design Machines

BY ATHANASSIOS ECONOMOU, ASSOCIATE PROFESSOR

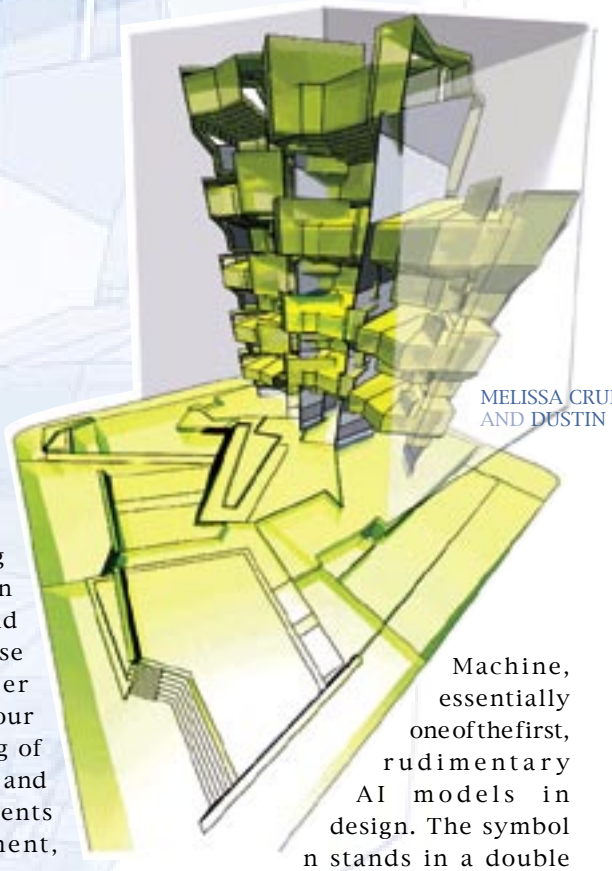
INTRODUCTION

New developments in computer-aided design and manufacturing technologies are dramatically reshaping design thought and practice. The fast evolving digital design and digital production technology has deeply affected the way architects and designers work and collaborate with engineers; new forms and structures are being explored, the gap between design and production closes, complexity and standardization are dealt in new ways. The medium that founds and supports these links is computation: computer-controlled design algorithms visualize designs that would be difficult or even impossible to be described otherwise. Similarly, computer-controlled fabrication machinery produces designs that would be very difficult or even impossible to be produced otherwise. Our romance with drawings or even traditional models is attacked on both fronts: drawings can not begin to capture the complexity of some of the digital designs and alternatively drawings may be forever uninformed and asymptote with specific discourses suggested by materials and technologies at hand.

The College of Architecture at Georgia Tech has taken several initiatives to explore these new interfaces of design thinking and making; these initiatives include a new MS/CCC program in Computation, Composition and Construction, a new Interoperability Lab, new classes in Digital Fabrication, and a reconstruction and rethinking of the course on fundamentals of Design Computing. Various areas of studies are explored and currently include formal models of composition, parametric modeling, shape grammars, building product models, design for fabrication, and building information modeling. All initiatives collectively provide an overview of these existing trends, critically reflect on the discourse produced, and engage into research in these new trajectories. The paper here sketches one of these four initiatives, the restructuring of the Design Computing Course, and outlines the major components of a networked environment, codenamed [n]DM, that was designed to facilitate design inquiry in these new areas of discourse. Illustrations from the first run of the experiment are interspersed in this text and they all show how digital modeling technologies, especially **form•Z**, were used creatively to support evolutionary, collaborative design.

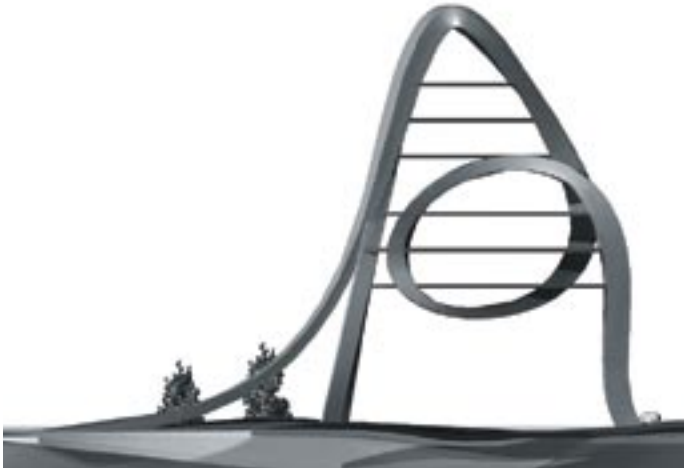
2. FRAMEWORK

[n]DM is a collaborative design environment for teaching formal theory of composition in architecture using CAD tools. The whole project has been built up from scratch for the teaching of the introductory course to Design Computing at the College of Architecture at Georgia Institute of Technology. The project is based on two key ideas: The Design Machine as an algorithmic structure for design (Stiny and March, 1981) and the Meme Machine (Blackmore, 1999) as an evolutionary model for design. The title is derived from the concatenation of the terms [n] and DM: The symbol DM stands as an acronym for Design Machine, essentially one of the first, rudimentary AI models in design. The symbol n stands in a double referential manner as an arithmetical quantifier denoting the chain relation of several design machines but also as an index of the collective authorship that emerges out of the continuous reshuffling of rotating authors-designers and the continuous reworking and transformation of some initial design ideas.



MELISSA CRUISE AND DUSTIN FIKE

The project applies and extends the structure of the Design Machine in a two-fold way: All original components of the initial model, the Receptor, Effector, Theory and Language are still used to model design activities and processes, and they all combine with one-another in a recursive manner to account for the multiplicity of the authors-designers (design machines) in the networked environment. The structure is also used to model the virtual representation of the environment itself by mapping one-to-one key parts of the collaborative space (briefs, lectures, software tutorials, architectural languages, threaded discussions, vote, agora, and so forth) to the components of the model themselves.

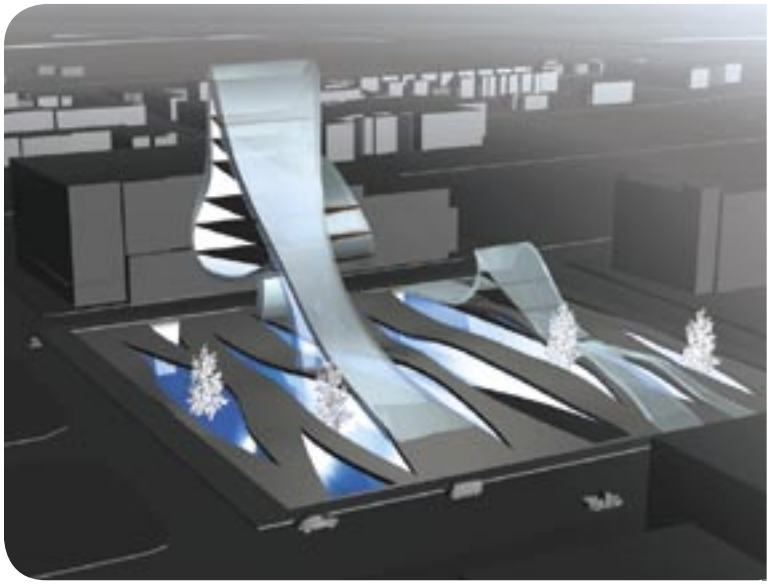


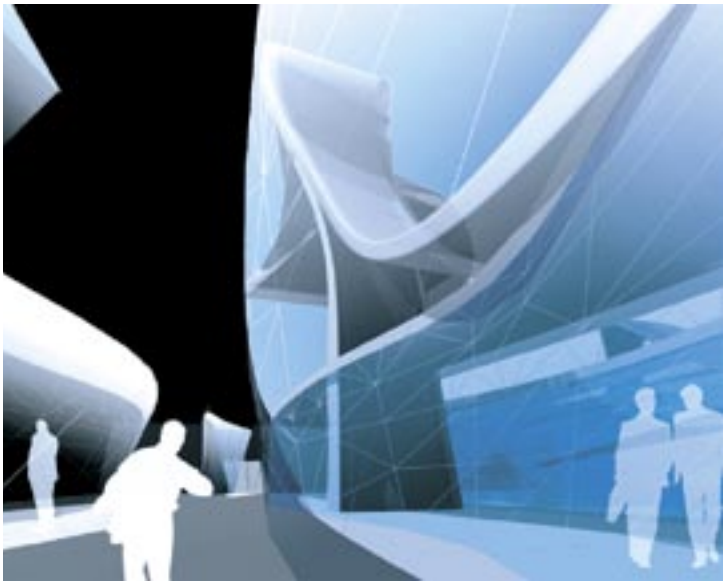
EHRET TOUATI, 2nd Year, M.Arch

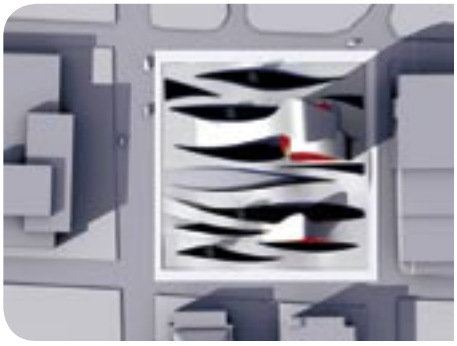
In-between Earth and Sky

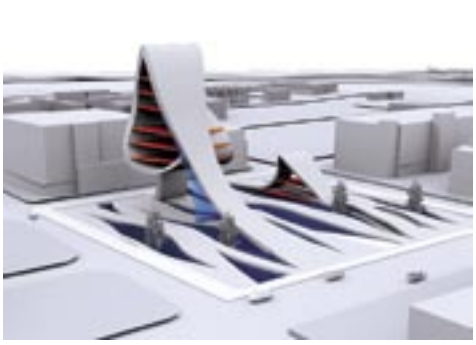
"I've been told that the justice should be accessible to anybody, says the man....Do not attempt to enter without my permission, says the guard. I'm very powerful." (Kafka, The Trial)

This position statement drove us to the idea of having a courthouse treated as an manifest accessible space. Against the typical typology of the block inserted in the center of the site, we experimented with the different ways of having spaces underground, spaces hovering above and in-between spaces. This allows us then to get closer to the idea of the public plaza, a gathering space in reference to the old Greek agora. The ground, or the plinth, is the interface between the public, circulating on the plaza and the courthouse services underground. The visual interaction is introduced by several patios bringing in the necessary light to the underground offices. The offices have been designed as longitudinal cuts on the plinth, appearing as dramatic urban gestures. The result is a series of bands along these patios. The courtrooms are growing from the topology of the ground, distorting, stretching and bending it, generating a loop and warp in the air. This relentless sculptural ribbon expresses the critical value of the interface between the state and the citizen.









KIM SIEBIEDA, 2nd Year, M.Arch
Absolute | Relative

..Roe vs Wade. Marbury vs. Madison. Plessy vs. Ferguson. Brown vs. Board Education. Dredscot vs. Sanford. It was Self-defense. Constitutional amendments. Innocent Until Proven Guilty. There are two sides to every story...

The Courthouse is organized by a public ramp that interweaves the cross-section of the building and alludes to a "cross-section" of justice. Each landing becomes a destination where the public can interact with certain restricted/working functions of the program (i.e.: libraries, clerk of courts office, record files, etc). The ramp keeps a secure control over the public, but at the same time allows a freer movement of the people (not just restricted to elevators and small gathering places outside the courtrooms. The front skin becomes an area for the public to occupy, an interstitial zone that balances the interior space of the courthouse with the outside city and celebrates the public as the joint between the two spaces.

2.1 Receptor

The receptor component of [n]DM is comprised by a list of briefs specifying various design tasks and a list of student teams rotating in a bi-weekly fashion. Team formations are done once briefs are given within the area of the receptor and no author is allowed to stay within the same team formation or the same project. Several components have been designed to automate the process: electronic forms for submission of author-ID, tokens of personality, representative work, checks for compliance with the rules, and so forth.

2.2 Effector

The effector component of [n]DM is the graphical representation of the design process followed within the course of the semester: paths of processes, evolution of designs, hybridization of rules and so forth.

2.3 Languages: -neo, -post, -meta

The language component of the [n]DM is the list of design solutions generated by the design teams during each study. One of the most important aspects of [n]DM is its claim in structuring languages of designs (sets of designs) in four phases, each related to some first language in a hierarchical way; these four phases are denoted here as languages, neo-languages, post-languages, and meta-languages. The transformations involved in the generation of these types of languages sometimes nicely parallel the rising complexity of the hierarchy of geometric transformations (March and Steadman, 1974, Mitchell, 1992) with its corresponding entries of isometries, affinities, linearities, topologies and destructive transformations, while other times linkages with other formal systems including shape grammars and transformational grammars (Stiny, 1990, Knight, 1994) are preferable. And still new interpretations that explain spatial transformations involving hyperbole, ellipsis, metaphor, allegory, and irony are introduced and cast in a constructive manner. The initial language for the first run of the experiment was selected from the early work of NY5 (Eisenman et al, 1975).

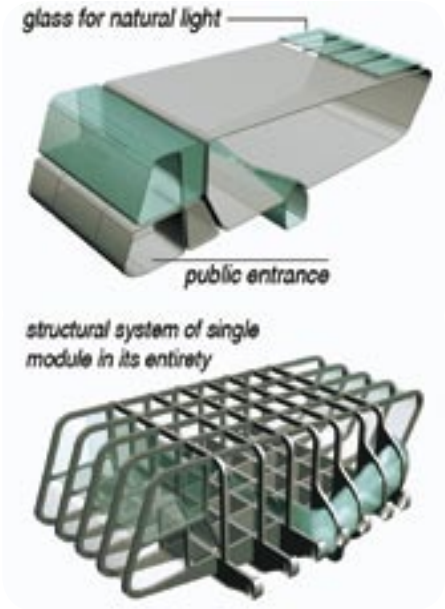
2.4 Theory

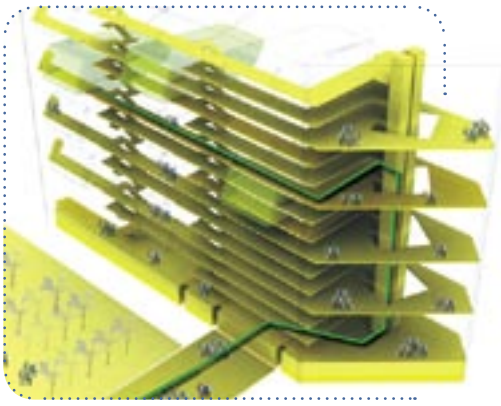
The theory component of [n]DM is a series of lectures on digital design media, tutorials on specific software packages, and a public domain involving a threaded discussion generated by the participants of the environment that questions, interrogates, and reflects on the subject-matter of the course. Ideas of fitness of program to the existing designs populating the language part are tested here. The lectures provide a framework for a systematic presentation and understanding of a variety of digital design media and their applications in architectural design and production. The lectures and tutorials component is divided in three sections, with the outer two extremes providing the introduction and a reflection on the field, and the middle one tackling systematically a variety of different digital design media and their applications in analysis and synthesis in architectural design and production. This middle body of lectures and tutorials is further differentiated in three sub-sections, the first (media) being a systematic exposition of spatial systems starting from three-dimensional media, to two- and one-dimensional spatial media, the second integrating these spatial media with temporal media and behaviors (multimedia), and the third (hypermedia) introducing agency to the user that experiences and evaluates the design world.

AMICHANDWALA RANGWALA, 2nd Year, M.Arch
Symbolic Revelations

"Today technology destabilizes and transforms the modern age...caught in this endless upheaval, technology can be used to positive ends–to advance one of modernity's greatest ideals; and that is social justice." – Richard Rogers

The proposed Federal Courthouse at Charlotte, North Carolina, is a civic building which surpasses national boundaries. Here, literal and metaphorical transparency and structural ingenuity are synthesized into a dignified yet accessible expression of the law's role in the modern American society. Through the process of design, an attempt is made to recast a major institution into accessible yet appropriately monumental expressions of justice–it intends to be a "non-monumental" monument. The proposed courthouse is organizationally dynamic, spatially dramatic, technologically innovative and institutionally imposing. With the courtroom devised as the identity generator of the courthouse, the building seeks to reflect not only the values of technological progress and civic renewal wall but all in all, the process of justice.





3. Discussion

An educational paradigm for collaborative design studies has been briefly introduced. The series of software tools used in this experiment privileges three-dimensional digital design media with the rest of digital media supporting the creation and interpretation of the three-dimensional spatial constructs. The design loop starts with the construct of three-dimensional spaces using **form·Z** in the first part of the course and ends using the Unreal Engine Runtime, a game engine authoring environment. The management of the course, the synchronous and asynchronous collaboration between the members of the teams, email, chat, threaded discussion, bulletins and so forth, is done with Lotus QuickPlace 3.0. A detailed description of the experiment and a complete documentation of the evolutionary paths of designs executed during the course can be found at: www.coa.gatech.edu/~economou/digital.

References

Blackmore S, 1999. The Meme Machine. New York: Oxford University Press.

Eisenman P, Graves M, Gwathmey C, Hejduk J, Meier R, (1975) 1997. Five Architects. Ed. Drexler A, Rowe C, Johnson P. New York: Oxford University Press

Knight T, 1994. Transformations in Design: A formal approach to stylistic change and innovation in the visual arts. Cambridge: Cambridge University Press.

March L, Steadman P, 1974. The Geometry of Environment: An Introduction to Spatial Organization in Design. Cambridge, Massachusetts: MIT Press.

Mitchell W M, 1989. The Logic of Architecture: Design, Computation and Cognition. Cambridge, Massachusetts: MIT Press.

Stiny G, 1990. "What is a design?" Environment and Planning B: Planning and Design 17 97-103.

Stiny G, March L, 1981. "Design machines" Environment and Planning B: Planning and Design 8 212 – 238.

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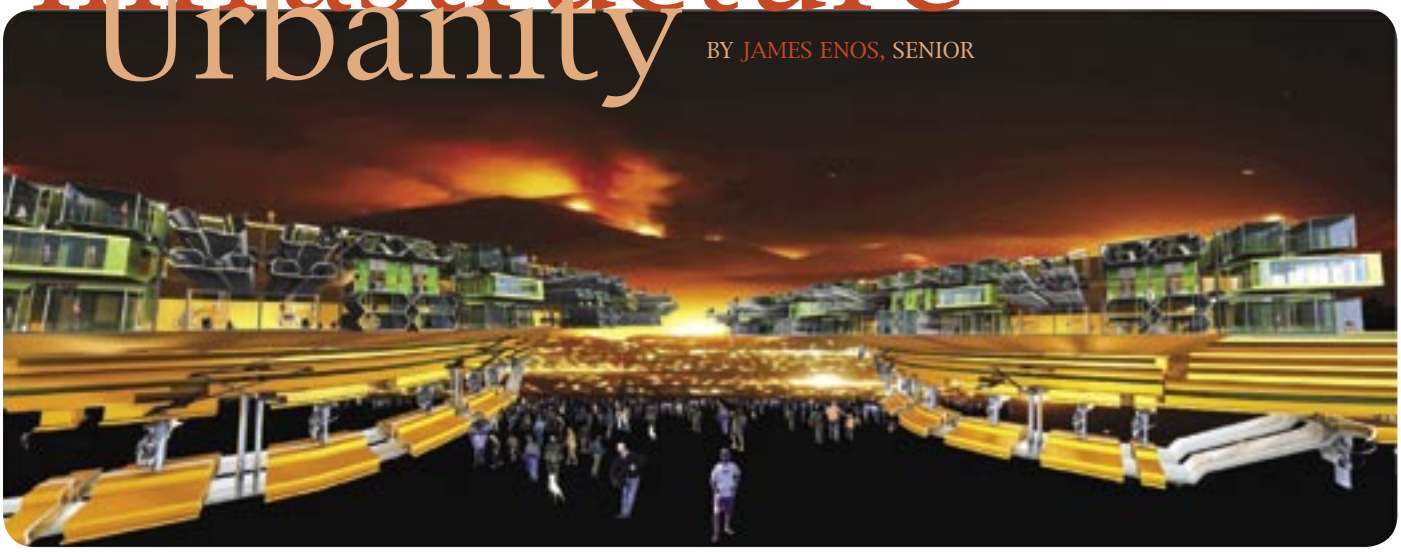
San Diego, California

Infrastructure Urbanity

BY JAMES ENOS, SENIOR



PROJECT DEVELOPED UNDER THE GUIDANCE OF TEDDY CRUZ, LEN ZEGARSKI, CAMERON CROCKETT, AND ALAN ROSENBLUM

This project proposes a human scaled diaphragm intended for multiple authorship and the continual adaptation of habitat. It is a Petri dish for a social re-direction; out of our historic faults and manipulated privatization schemes and into a communally restructuring process that takes advantage of our market dependence, e.g. increased efficiency driving cost/production structures to slim attainable minimums. This is achieved by locating and further isolating critical points (dynamic geographies of abundance) of capital activity for use. Moreover, by formalizing our colonization within exchange mediums we increase our ability to weather class deprecation from continual restructuring processes of comparative advantage and industrial selection.

Transnational capital continually patrols physical infrastructure systems and provides abundant resource for an unharnessed and sensible urbanism. This project advocates the need for another massive intervention at the scale of the New Deal in 1958 that futuristically led to the development of major public works, such as our interstate system and the modern circulatory freeway. This inquiry supposes that an exhaustive analysis of global commodity flow and dependence can further benefit an architecturally conscious spatialization. Critical points of interchange are to be marked as strategic typologies for the promotion of density.

It is intended to combat the viral sprawl that the fist wave of connective projects had created in-between our watersheds, and to promote slimming the super-organism. The project requires the insertion of a multiple author open-source system serving as a diaphragm for the future of privatization and collectivity. It is a layering of ourselves upon the market which resides upon our communicative/transit system. It is measured to maximize efficiency, distribute abundance, and gift our lives more time (less spent in the pursuit of elusive capital).

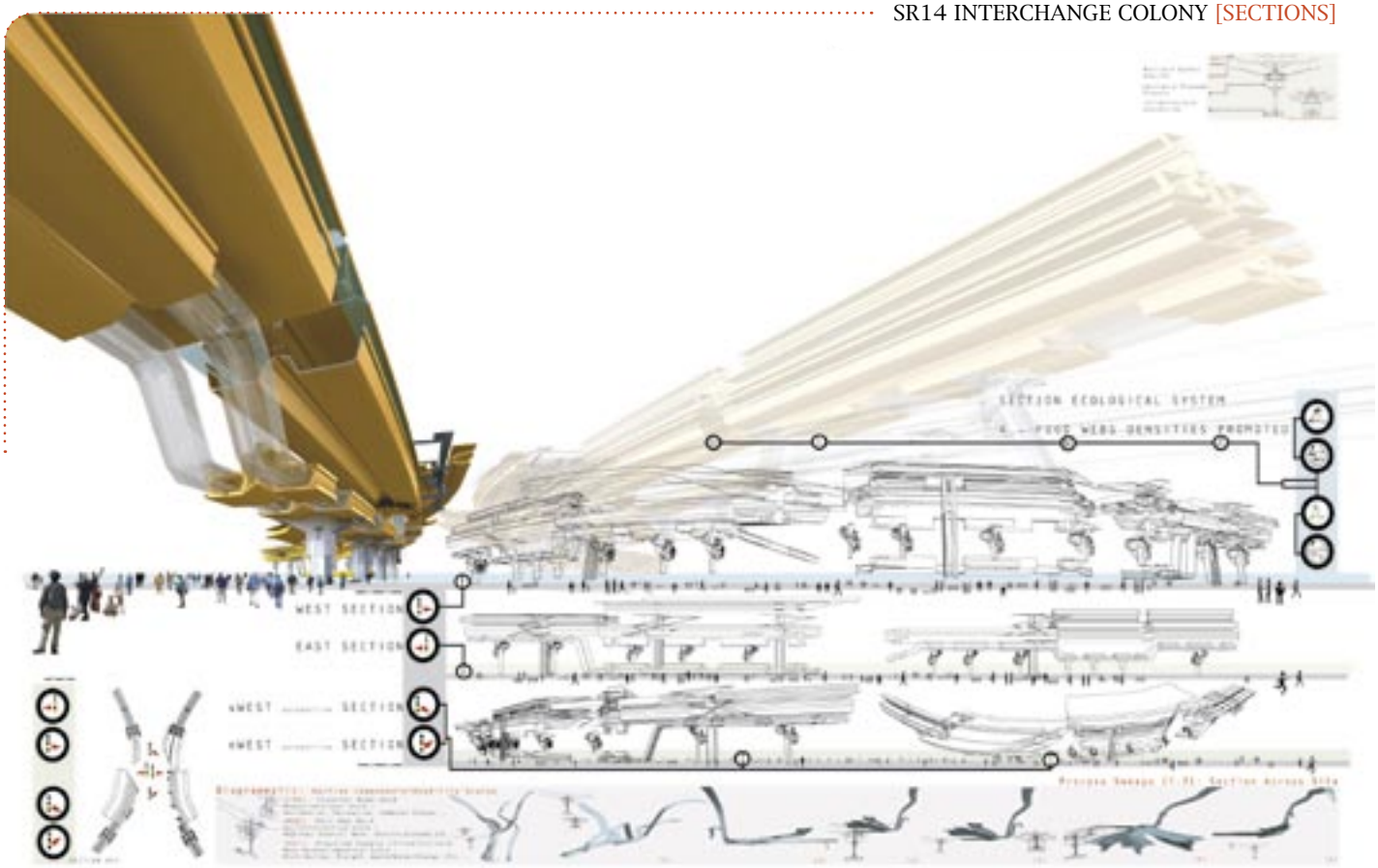
As offers of architecture, we are to provide solutions that will weather the continual restructuring processes of accumulation as they occur. We are to provide an architecture of time and connection to grow past the superficialities of capital.

Interoperability and Dependence: Evolving Complexity

The importance of tight connections is easily seen under the super organism construction. Our economy's reliance on the expansion of technological and social systems demands a greater interweaving for the future. The process of global integration and extended market dependence creates an environment of fused reliability. For example, if General Electric seeds to expand their market penetration in Yemen to develop a new consumer base, they begin to forge a future dependant capitalistic relationship of the aforementioned production – consumption nature. This transcends all former boundaries and plants the seed for future communicative contact. Further integration will promote homogenization, yet it will continue to increase individual freedom for the pursuit of objects. However, in the short term it can be seen that there will be a by-product of diversity, yet eventually this will be eradicated for new-formed global norms. Eventual uniformity can still yield diversity but it is a fact that diversity reigns under the prospect of variance. Continual variance must be built into the system as a series of chaotic mis-encounters or actions that breed deference. In respect to the architecture of a super system, we must set forth highly compoundable and adaptive building blocks that are sturdy and simple in their inception. For any internal or imaginary future configuration to take place, we need structures that are incomplete and stay evolvable in constant disequilibria.

There is great promise that this super organism will continue to combine and collide our little worlds without recourse unless we learn how to guide it through the act of architectural spatialization. The information revolution is clearly a communicative paradigm shift that has created a planetary nervous system. Moreover, the advent of distributed processing amongst de-centralized machines has created a super intelligent super being with the capability to trump anything before. However, these developments are strictly linked to the will of capital appreciation. What we will have to begin questioning is which end-user ideology these acts serve. Technology alone will not save us from directive of transnational development and only an intelligent embrace of transition can begin to guide our influence upon the quality of capital space. This high-powered super-computing-organism continues to proliferate and is beginning to resemble its own controlling agent or global brain. This is part of an evolutionary transition to a higher level of complexity. The remaining question is whether this transition will lead to the integration of the whole of humanity [collective], producing a human "super-being" or merely enhance the capabilities of the share-holding few [individuals], thus producing a multitude of "meta-beings".

SR14 INTERCHANGE COLONY [SECTIONS]



INDIVIDUALS OF SCALE: COLLECTIVE/1

A solitary ant in a field cannot be considered to have much of anything on his mind; indeed, with only a few neurons strung together by fibers, he can't be imagined to have a mind at all, much less a thought. He is more like a ganglion on legs. Four ants together, or ten, encircling a dead moth on a path, begin to look more like an idea. They fumble and shove gradually moving the food toward the hill but, as though by blind chance, it is only when you watch the dense mass of thousands of ants, crowded together around the hill, blackening the ground, that you begin to see the whole beast, and now you observe it thinking, planning, calculating. It is an intelligence, a kind of live computer, with crawling bits for its wits.

ADDITIONAL RACK MASSING UPON INFRASTRUCTURE

Dual Hub Converge
Main Hub Docks
From Ground Plane

Dual Hub Total
HHD Feeding System
+ Total Decks

Skewed Perspective
From Base Center
Looking N/West

Deck Internal
Unit Elevation Vista

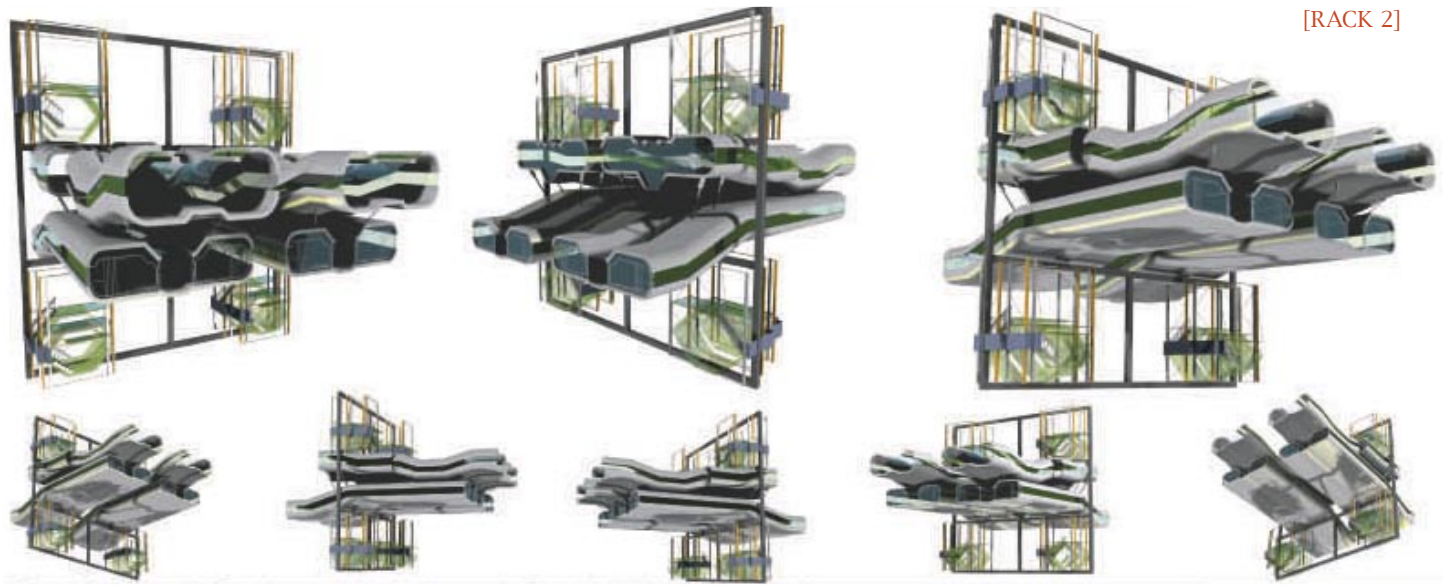
Perspective Collision
2 HHD Vista

Capital Spaces/Productive Dwelling [1-8]: Relax/Expand/Scour Opportunities

Nomadic Plug/Dependant Class [1-8]: Hang On/Search Scraps/Manage Disabilities

Single Professional Transitions/Climbing Class [1-8]: Ladder Housing Mobile Lifestyle/Vertical Aspirations

[RACK 2]



Capitalist Pads with Visual Exploitation Pods

HUB MARKET CYCLE: RELATIONSHIPS/VARY

CHASE YOURSELF: GUIDE WHAT YOU GROW

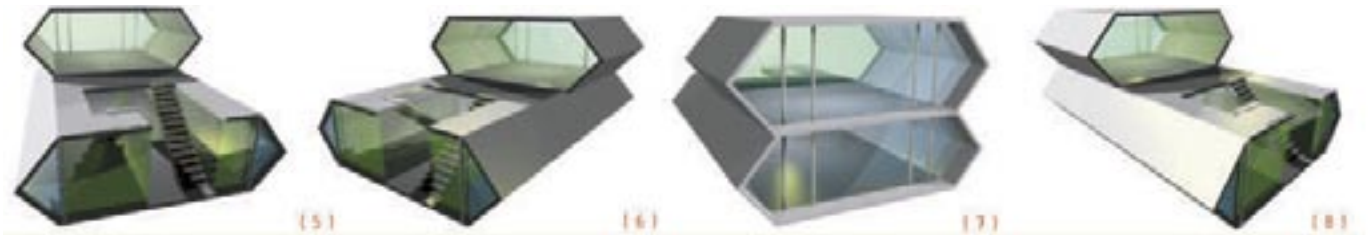
Parasite Renters Aspiring to become Owners

This project intends to strategize upon the idea that we can somehow manipulate the accumulative processes of transnational capital in order to reap social benefit. This means that if we begin to study the major points of exchange, collection, or abundance, we can plan our alterations accordingly. If the world is rapidly hybridizing, polarizing, or homogenizing under definite and eventual onslaught of globalization, how do we begin to respond with principals that can serve as adaptive urbanizing methods? How can we respond to new typologies such as habitable transit interchange, such as I am suggesting? It is my thesis that suggests we will need to seek out these interchanges for the abundance they offer and the urbanity they will vitally support. It is a matter of when not if.

Look at the fastest growing cities, economies, and regions; what we find is a positive correlation between the proximity to infrastructure and the magnitude of transnational capital resource (junctions of colony). What I have tried to examine is the need for another massive intervention at the scale of the New Deal in 1958 that futuristically led to the development of major public works such as our interstate system, and the modern circulatory freeway that bisects our city/lives. What I am proposing in light of predictions for greater polarity amongst the class structures of our world, is a social infrastructure/public works agenda to begin to curve the viral sprawl that the first wave of connective projects has created in between our watersheds. I am looking for the insertion of a multiple author open-source system serving as a diaphragm for the future of privatization and the social public. It is a layering of the market upon our communicative/transit system as an attempt to maximize efficiency, distribute abundance, and curb regional ills associated with capital's certain restructure.

The location of a critical interchange exists. In fact, there are many points where all is present to increase the efficiency of the social urban machine. It is the charge of architecture to spatialize our needs and effectively manage individual requests from the greater machine. This intervention is made most compoundable at the infrastructure level.

Plug in Commercial/Mixed Use Units: Work/Live/Rent



EMERGING GEOGRAPHIES: IT WILL GROW

A human scaled diaphragm interred for multiple authorship and the continual adaptation of habitat. This is a Petri dish for a social redirection; out of our historic faults and manipulated privatization schemes and into a communally restructuring process that takes advantage of our market dependence, e.g. increased efficiency driving cost/production structures to slim attainable minimums. By locating and further isolating critical points (dynamic geographies) of capital activity, we increase our ability to resist class deprecation due to the continual restructuring of comparative advantage by industry.

ADDITIONAL RACK MASSING UPON INFRASTRUCTURE

Ground Impact North/West Perspective
Main Hub Desk Unit Attachments

Level Elevation South/West
Rack Vistas From Mirroring Deck

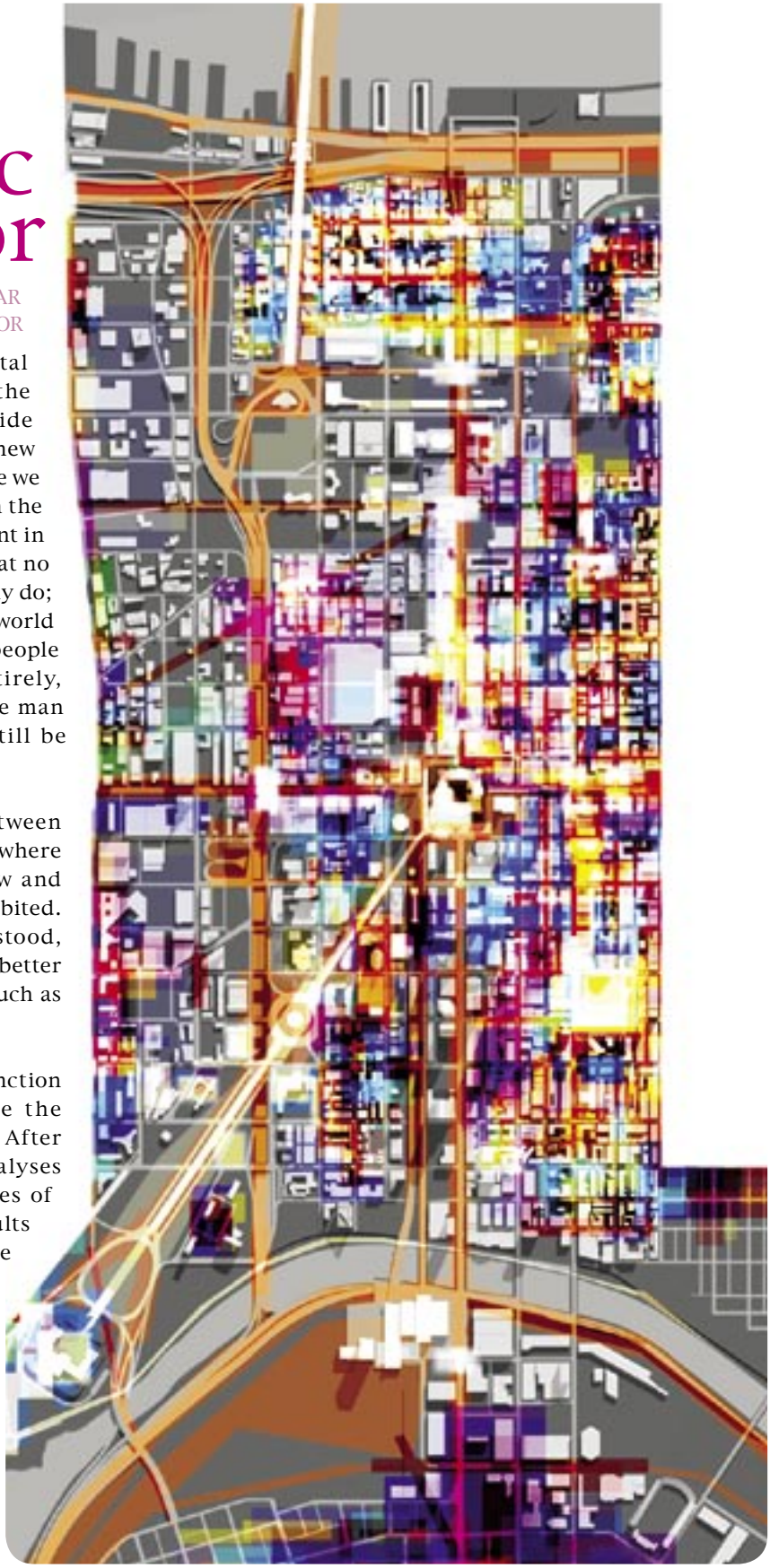
Warms Eye
From Base Center

30x60 Total Sweep
Unit Population on Central Level

Projection of Verticality
Unit Ascertation Vertically

The Digital Self An Organic Processor

BY CHRIS COLGAN, FIFTH YEAR
ADVISOR: JAMES MOUSTAFELLOS, ASSISTANT PROFESSOR



The idea of exploring the conceptual "digital self" came from a growing interest in the ethereal place known as the "world wide web". The internet provided everyone with a new type of place–and a new definition of space–where we can gather and share our experiences. Although the web may be intangible and seemingly non-existent in our world of sensory perception, it has done what no other physical space on the globe could previously do; fit everyone in. However, simultaneously, the world wide web also acts as yet another space where people can be displaced, or even excluded from entirely, making it not so different than any other space man of the past. A newly defined space, it can still be similarly grounded.

The challenge then was to find a balance between the digital and physical worlds to understand where this digital place can help us to gain and grow and where it becomes a place by which we are inhibited. Once the "digital self" was found and understood, the physical self–the organic processor–can be better integrated into our newly defined social places; such as the world wide web.

Architecture has long been defined by its distinction of space and place; so, fittingly, it became the means to study the rift in the digital world. After a series of architectural explorations and analyses of the digital processes and physical processes of interaction, research and design, the best results could be found through using both to enhance the other. Regardless of the medium of study, architecture was by no means the answer, simply the catalyst that could provide the change needed to create a balance between the physical and intangible.

The digital world is best defined as a place of information and a social center, so a site that has long been the place of information and social gathering was picked as the context in

which to study this thesis. The Free Library of Philadelphia is home to the traditional method of information storage, books, which have become outmoded and unused, along with the library itself, in today's world where information can be found in seconds on the internet. However, what is still missing and is further supplemented by the internet is social inclusion. Social contact is the key to understanding the need for a balance between the digital world and the physical world; people will forever need to feel and be felt.

From architecture we have identified a latent need to map our embodiment onto the world. Here, users feel the need to maintain a relationship to technological constructs whose dimensions resemble those of the human body in architectural space, attempting to retain a self image. This self image must be shattered in order to allow the digital self to take its place.

Through the architectural studies, it was found that the combination of a newly defined physical space–where the user begins to question his place as result of comparison to an older space–along with the newly defined ethereal space of the internet was the only way to allow oneself to find their digital self. Hence the project focused on the point where new spaces met the old spaces of the original library. The project focused on the west wing of the library, where the new spaces broke out of the old, creating a new identity for the entirety of the old library. This newly defined place of information would act as storage to new and old information and act as a place where anyone could access both while interacting socially with others.

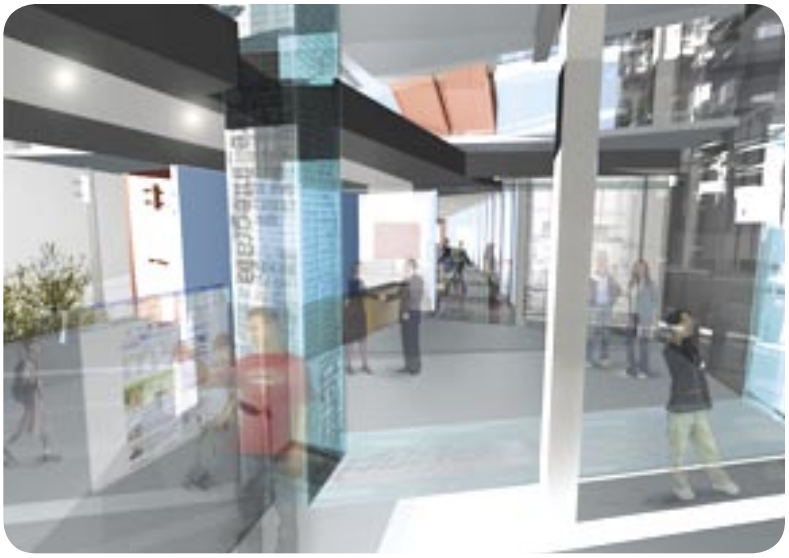
Only by creating a new form of architecture and by redefining spaces can embodiment provide a place where identity is comparatively unknown–allowing a new self image to take place. Within a digital atmosphere in this new place of identity, one can find their digital self. The digital self is the extension of our physical self, reaching past the identity which we've come to know to an evolved digital state where we become our own organic processors.

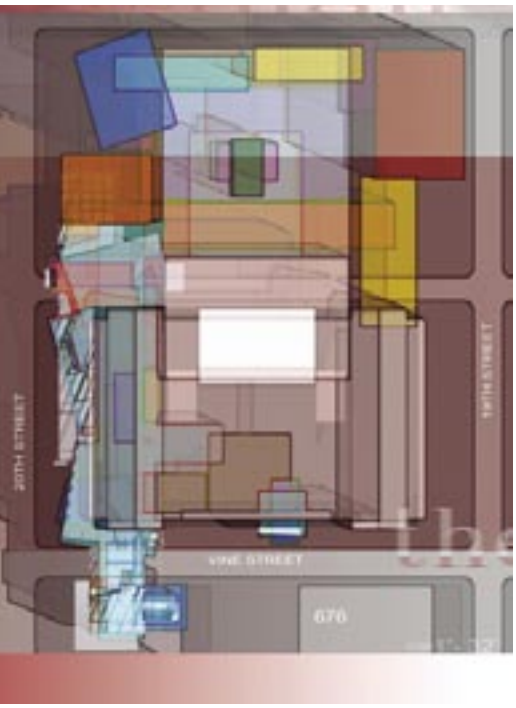
- Chris Colgan

INSTRUCTORS COMMENTS:

The strengths of this project lie in its attempt to understand the relationship between the physical and digital worlds through an exploration of communication, process, product and representation. An important step early in the research process was the identification of the limitations inherent in many peoples' preconceived limitations of digital technology in architecture as a sophisticated method of representation. The goal of the study was to define the advantages and disadvantages of both physical and digital modes of operation to optimize the use of each when appropriate. This was achieved through a method of "total immersion", beginning first with a period in which communication, research and writing could only be done through digital means and working slowly toward a more balanced approach that was ultimately more effective. Through this method, limitations and advantages were identified and implemented as part of the design process as well as to develop the programmatic spaces of the proposed library. Thus the final proposal is both a process and product derived from an exploration of digital media as a design tool and a space of social interaction.

- James Moustafellos, Advisor/Instructor




20TH STREET
19TH STREET
VINE STREET
676

Habitat(ion)

Architecture Program
TYLER SCHOOL OF ART, TEMPLE UNIVERSITY
Philadephia, Pennsylvania

BY JON SULENBERGER, FOURTH YEAR
ADVISOR: BOB TREMPE, ASSISTANT PROFESSOR

The departure point for this project was to chose a mobile condition and analyze how this condition shaped the perception of space around a user. The condition of branding (logo) was chosen both due to its repetitious nature and the fact that this nature is manifested in every aspect of life today. The iconography of logos together with the mind's ability to relate/trigger imagery enables the logo to be viewed as an element of a corporate control system. The logo can manipulate human action and emotion based upon the relationship of past personal memories and some instance of the logo. This theoretical position was the basis of a conceptual model representing a 24 hour day in which temporary conditions were physically represented and affected by the memories of logos from past experiences.

The relationship between these memories and a current temporal position was further developed into a conceptual physical model, articulating relationships between the abstract nature of the conceptual digital model and that of a body part. Treated as a system of armor, this model sought to represent the same relationships displayed between logo/memory and memory/site. The site for this exploration was the human body, but more specifically the hand, as the hand is unique in that its current position is affected by stimuli around it, say a hot stove or cold water. This stimulus triggers an automatic response within the hand in which the form changes to accommodate each new contextual condition. Much as the logo triggered responses to memories past (effecting a relationship of user and space), the site model became a physical representation of the temporary positions of the hand and how they overlap.

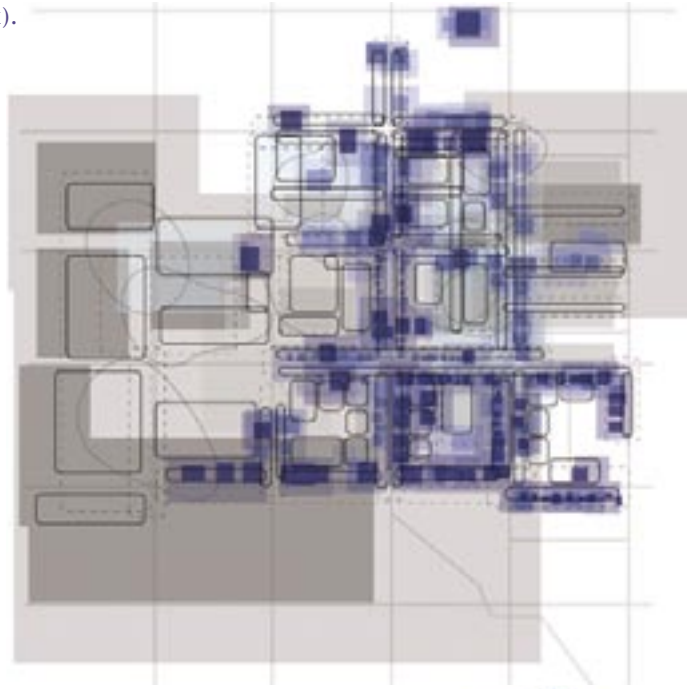
The relationship between the temporal conditions of expansion and contraction coupled with that of the conceptual study of memory and logo directly translated into the next step of this project: the site analysis of an urban infill condition. The site was located on a vacant parking lot at the corners of 3rd and Arch streets in Old City, Philadelphia. Examined for the existing fluctuations between programmatic space [physical] and programmatic space [influence], this analysis sought to understand the characteristics of the existing site through relationships made back to the conceptual models. An understanding of how the strength and memory of programmatic usages mixed in the streets resulted in an understanding of how these memory conditions created virtual enclosures within the street itself. The overlap of these functions was analyzed to determine the potential program for an architectural intervention within the urban fabric. The program of a religious environment that transforms into a restaurant and commercial shop was chosen both for the potential memory relationships set up by these conditions as well as the fact that nowhere on the site exists an engaging religious habitat. By analyzing the abstract site model it was determined that the user group was to be the normal flow of patrons already existing on the site.

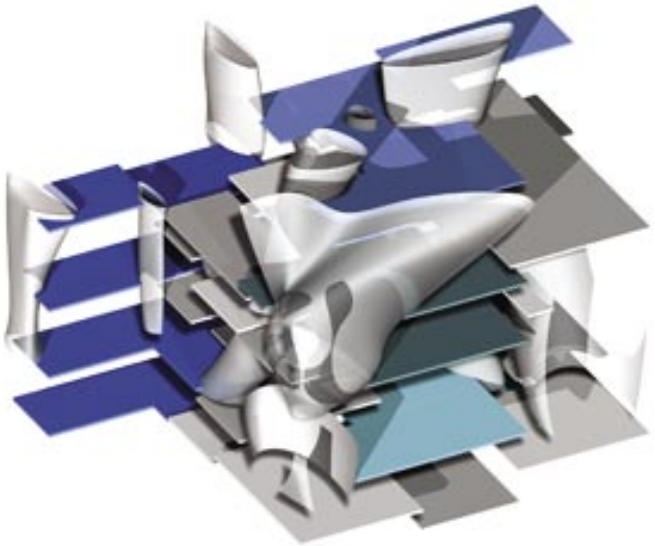
By combining each study through the explorations and processes of this project, a logical language was implemented to guide every aspect of the architectural design. The design was first laid out as a narrative, reflecting the procession of program necessary to implement such contrasting functions as religious meditation and consumer shopping. These spaces became floor plates that adjusted through elevation/section to create the procession based upon their role within the narrative. These floor plates were then connected via/through transparent forms (memory volumes) so people could view their past or their future, both of which affect their current condition.

Interior Rendering looking at one of the "memory" voids.

These relationships were shared through the skin of the building as well. The transparent forms (memory volumes) were sliced by the façade (a condition of site and setback ruling) and still perform their function of memory since people would now be able to see into the building and out of the building to the street below. Material conditions of the façade further enforced these rules through varying degrees of transparent and semi-transparent materials, coding information about usage through material constraints.

Arch Street Elevation (left) and Third Street Elevation (Right).



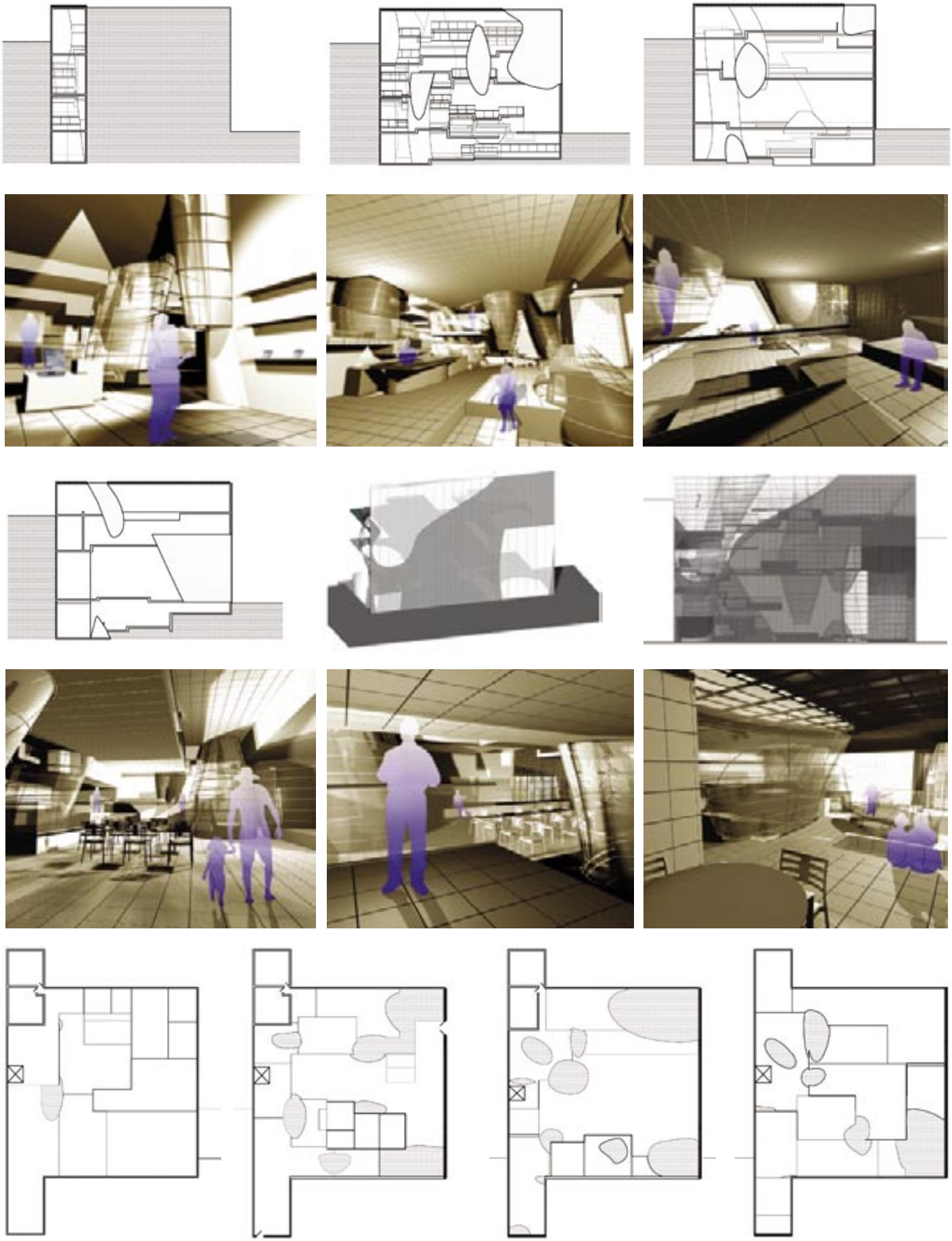


Advisor's Comments

A major role of this upper-level design studio was to teach students that the power of computer modeling offers us much more than merely the ability to represent final constructions. Too often digital media is seen as being a sort of end-game move, a technique and process reserved for the final moments of architectural investigation when it is time to finally display the results of process. However, digital tool sets afford us the opportunity to understand much more than just the resultant construction. These tool sets afford us the chance to explore and understand qualitative conditions of site, user, experience, and event, visualizing this data in ways sometimes too limited by conventional means. Treating the computer as a tool for exploration and investigation, students were able to take seemingly abstract systems developed around the idea of an event and dissect/analyze them. Through this analysis, students both witnessed and took part in the evolution of a basic idea from initial investigation all the way through to final site intervention.

This process of evolution from the abstract to the concrete form is one duly suited to the tool sets of digital media and modeling, and Jon's project is a perfect example of this process. In every step of investigation, Jon consciously reworked and manipulated the qualities (geometric, parametric, material) found in the initial qualitative investigation, using the same model (or parts from it) in every step of analysis. This process comes through clearly in the final presentation of his project, and acts as an example as to the power of digital media in design today.

- Bob Trempe, Assistant Professor and Principal Investigator



From the Final Presentation Board, which displayed all of the processes involved in the intervention from conceptual to building.

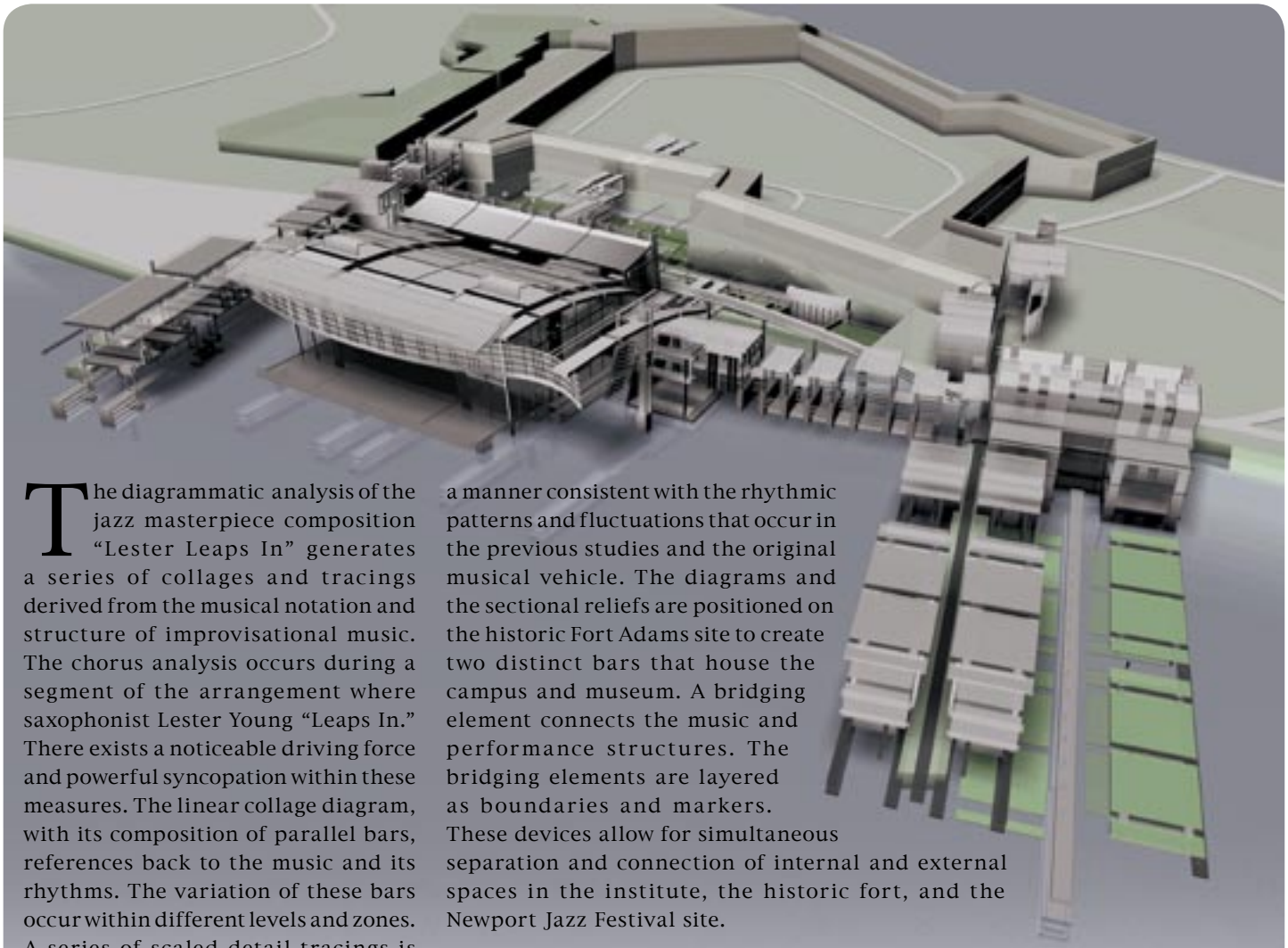
Institute for Jazz Studies at Fort Adams

College of Architecture
TEXAS TECH UNIVERSITY
Lubbock, Texas

AWARD OF DISTINCTION IN ARCHITECTURAL DESIGN

ALSO SEE PAGE #4.

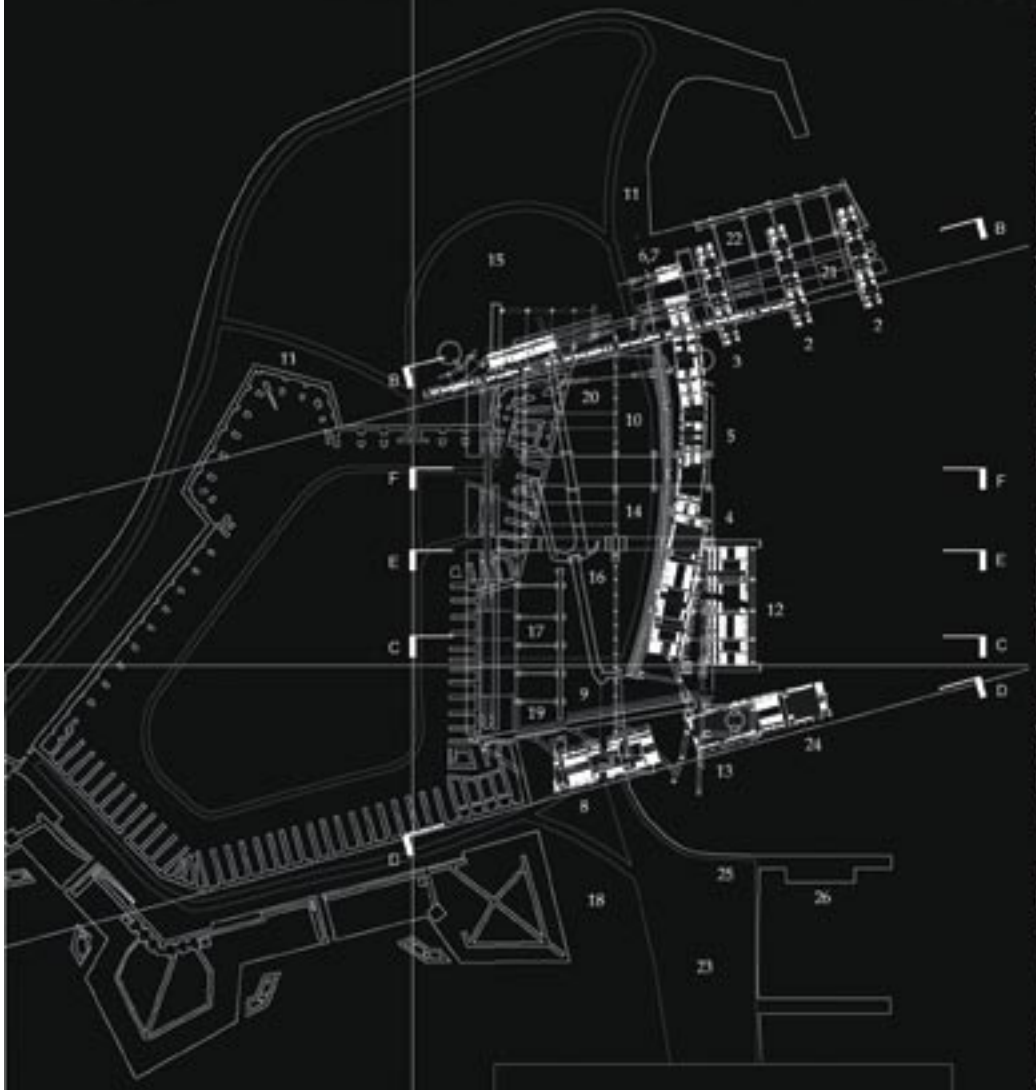
BY JEFF OLGIN, FOURTH YEAR
ADVISOR: BENNETT NIEMAN, ASSOCIATE PROFESSOR



The diagrammatic analysis of the jazz masterpiece composition "Lester Leaps In" generates a series of collages and tracings derived from the musical notation and structure of improvisational music. The chorus analysis occurs during a segment of the arrangement where saxophonist Lester Young "Leaps In." There exists a noticeable driving force and powerful syncopation within these measures. The linear collage diagram, with its composition of parallel bars, references back to the music and its rhythms. The variation of these bars occur within different levels and zones. A series of scaled detail tracings is derived from the structures seen in the diagrams. These layered line tracings act as a bridge between the diagram sequence and a sectional analysis. The spatial relationships found in the line tracing templates are reconfigured into speculative relief sections and layered section models.

The Institute for Jazz Studies requires the following major programmatic components: campus, tourist traps, performance, gardens, plazas, and transportation. The program is sited in a manner consistent with the rhythmic patterns and fluctuations that occur in the previous studies and the original musical vehicle. The diagrams and the sectional reliefs are positioned on the historic Fort Adams site to create two distinct bars that house the campus and museum. A bridging element connects the music and performance structures. The bridging elements are layered as boundaries and markers. These devices allow for simultaneous separation and connection of internal and external spaces in the institute, the historic fort, and the Newport Jazz Festival site.

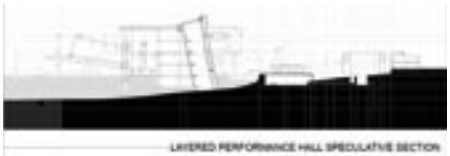
program



Institute for Jazz Studies

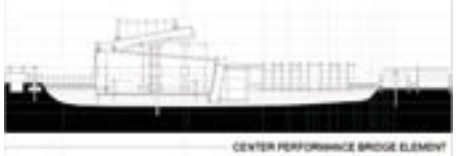
Campus	
Administration	1
Dorms	2
Lecture Halls	3
Rehearsal Halls	4
Rehearsal Cells	5
Jazz Research Library	6
Jazz History Archives	7
Tourist Traps	
Jazz History Museum	8
Monk's Dream Bookstore	9
Market/Kiosks	10
Refreshment Bars	11
Performance	
Jazz Concert Hall	12
Lester Leaps In Nightclub	13
Outdoor Amphitheater	14
Newport Jazz Festival	15
Gardens	
Jazz Sound Garden	16
Instrument Garden	17
Entry Garden	18
Water Garden	19
Plazas	
Playgrounds	20
Body Exercise	21
Informal Sports	22
Transportation	
Parking	23
Jazz Boat Dock	24
Bus Stop Stations	25
Water Taxi Station	26

section



LAYERED PERFORMANCE HALL SPECULATIVE SECTION

'LESTER LEAPS IN' RESTAURANT/NIGHTCLUB

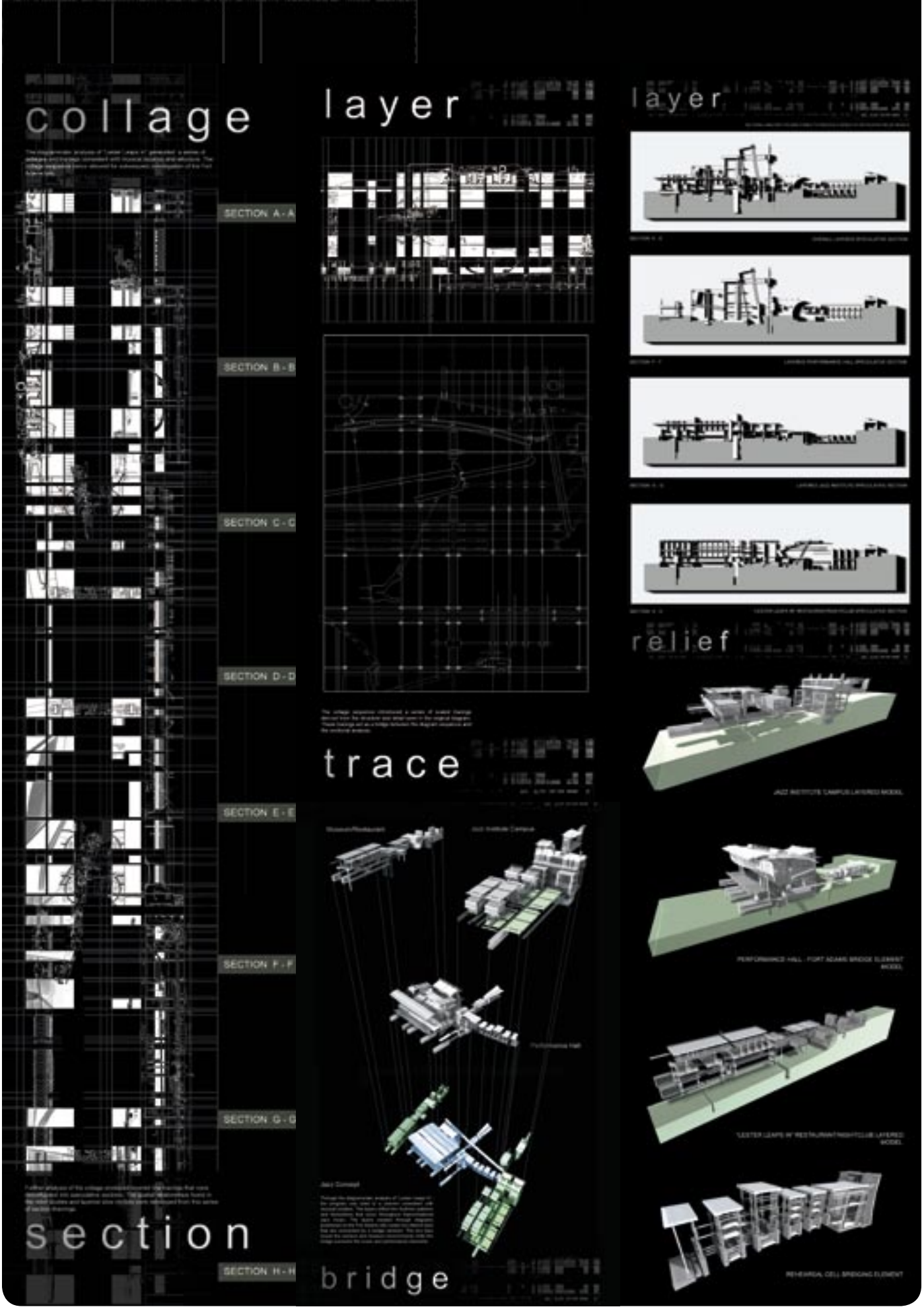


CENTER PERFORMANCE BRIDGE ELEMENT

LAYERED JAZZ INSTITUTE SPECULATIVE SECTION

OVERALL LAYERED SPECULATIVE SECTION

JAZZ INSTITUTE CAMPUS


collage
SECTION A-A
SECTION B-B
SECTION C-C
SECTION D-D
SECTION E-E
SECTION F-F
SECTION G-G
SECTION H-H
section
layer
trace
bridge
layer
relief

JAZZ STUDIO FINAL REVIEW COMMENTS
APRIL 29, 2005

BENNETT NEIMAN
Associate Professor, Texas Tech University

JOHN MARUSZCZAK
Associate Professor, University of Texas at Arlington

KENTARO TSUBAKI
RA, Pasanella + Klein Stolzman + Berg Architects

JESSE VOGLER
Instructor, Texas Tech University

JOHN MARUSZCZAK: This is outside the pattern we have followed in terms of the critiques. In some ways it's more developed as a project. I was just surprised that what seemed to be important was the idea of the sunken garden. This idea of a bridging mechanism and the idea of a large performance hall that opens out towards the water, indicate in many ways, lines of demarcation. The jazz institute pulls up and holds the area of the jazz festival together, and the museum or public zone creates a separation between inside and outside. My criticism is that you could have pushed the volumetrics more. Right now it appears that these areas could use an adjustment of space and volumetrics in order to pursue your concept further. Would you adjust your volumetrics now in any way?

JEFF OLGIN: I found that the sections, the tracings, and subsequent reliefs didn't give me the spatial quality and experiential volumes that I was seeking. Going back to the elements within the model, I now see a more orthogonal and linear pattern. But there are also a lot of opportunities within the smaller elements to find more manipulative forms that could have been explored. I have ended up with an overall scheme that is more orthogonal and linear.

JOHN MARUSZCZAK: What is quite amazing is the way a relationship occurs between the bridge and what we are calling the fly space. I can see more tension in relating these to each other by extending the fly space and incorporating it with the bridging element. This would benefit the experience of being in this place. You could begin to create even more tension by shoving the theatre towards the campus and festival site, allowing for a more interesting volumetric that we talked about previously. The volumetrics are quite successful as you see it moving across the bridge and I would like to see more emphasis on the whole entry sequence with the water, theatre, and gardens. I think the gardens get lost in the space that occurs between water and site. There are very large components to your design that sit between these two elements and create a barrier to those who would be experiencing the gardens.

JESSE VOGLER: There are certain weak points in the bridge which I think John is bringing up. I think the biggest fault occurs on the alternate side of the performance hall. In your plans, the rehearsal and practice cells look like an ambiguous piece. There is an issue between these two bars, but in the end it is really three different things. There is the bridge itself and the area of rehearsal cells where the site begins to break apart in terms of coherently relating the bridge and bars. The bridge that arcs to get out of the way of things is just not doing anything. It's just there, super-imposed, whereas that element could really begin to lock in some of these larger areas.

JOHN MARUSZCZAK: Why is there no real sectional development of the institute bar? I just question why you had to go with a mat strategy here. I think the whole emphasis of this bar is to define the festival area. That's the heart of the whole project and I find this bar positions itself here and says, "I'm the new heart." Again maybe I'm too much of a traditionalist, but I would rather have it placed somewhere where it can be defined as an entity and not overwhelm any of the other areas. I like the idea of this edge that you have created, whereas I thought the bridge could be an extension of the stage and the overall performance.

BENNETT NEIMAN: I think once again we see a situation where he had this plan early on and the sectional development got really exciting. Since he has some experience with **form·Z** *and the rest of the class didn't, there was an opportunity for him to go from the section to a digital relief of the scheme. There was never a reconsideration of the plan. It was an interesting idea five weeks ago. Why is this still here?*

JOHN MARUSZCZAK: Right!

BENNETT NEIMAN: I also did not see the animation before this presentation. It was the last thing that was produced, but it's interesting to me that the view vignettes are more effective as an idea of the mood of the place. When you see it as a 3D animation it exposes the flaws which the jurors are revealing. When you look at the perspective views they are more successful. The overall scheme needs a re-conceptualized plan.

KENTARO TSUBAKI: The thing that I respond to is that you need to experiment with figure ground within the existing Fort Adams structure. Because your project is in an advanced stage of development I want to go back and put myself within this place and I am not one-hundred percent sure how nice of a feeling I would have in the courtyard. It seems to feel like it's a backside of the bridging element and not incorporated well with the water that surrounds the site.

JOHN MARUSZCZAK: You actually might consider dealing more with parking. I think it would help your scheme. You have established this frontally, as if this is a public building and I think there are opportunities to flow onto the site and back into the courtyards in a way that is better connected to the space and places you are creating.

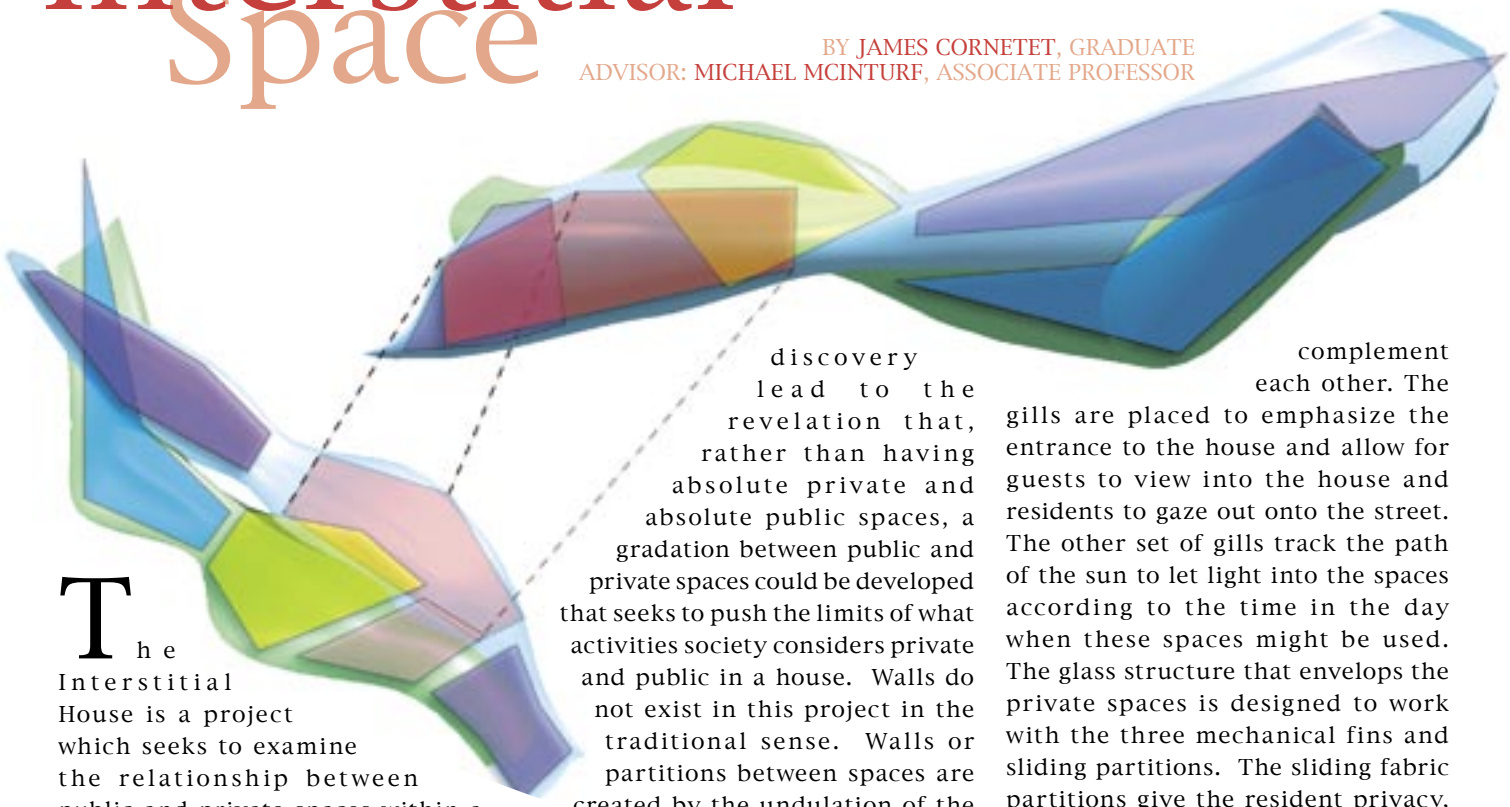
KENTARO TSUBAKI: The images are extremely provocative and intricate and it seems that there is so much going on. I think there is a way to be on a scale where you can expand and compress. If it always on the maximum, just as in a musical arrangement, where you are hearing everything at a maximum force, it is overwhelming and a little hard to take in.

JOHN MARUSZCZAK: I am encouraged by your process in the sense that I like the idea that there is this built-in chance. You are forced to experiment and forced to respond to changing circumstances where usually at this level of studio, the idea is to find a concept or a "big idea" and then hammer it out where you are judged on consistency. In those situations one never has the chance to look back at the project during the process. The projects themselves will often lack a linkage within development and thought. I enjoy the project where there is an open-endedness and the student deals with and regulates the process. You have to learn to respond to changing circumstances, which I think is more analogous to the real world.

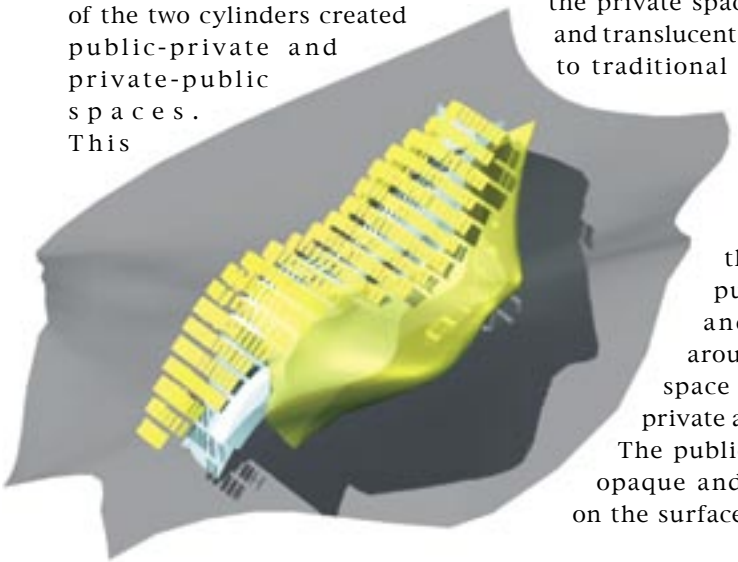
School of Architecture and Interior Design
UNIVERSITY OF CINCINNATI
Cincinnati, Ohio

Interstitial Space

BY JAMES CORNETET, GRADUATE
ADVISOR: MICHAEL MCINTURF, ASSOCIATE PROFESSOR

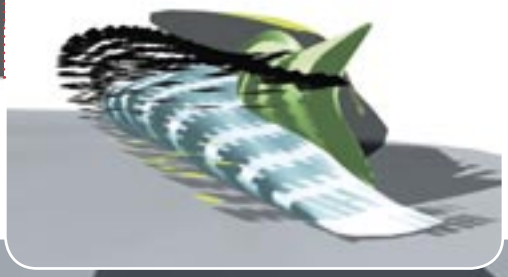


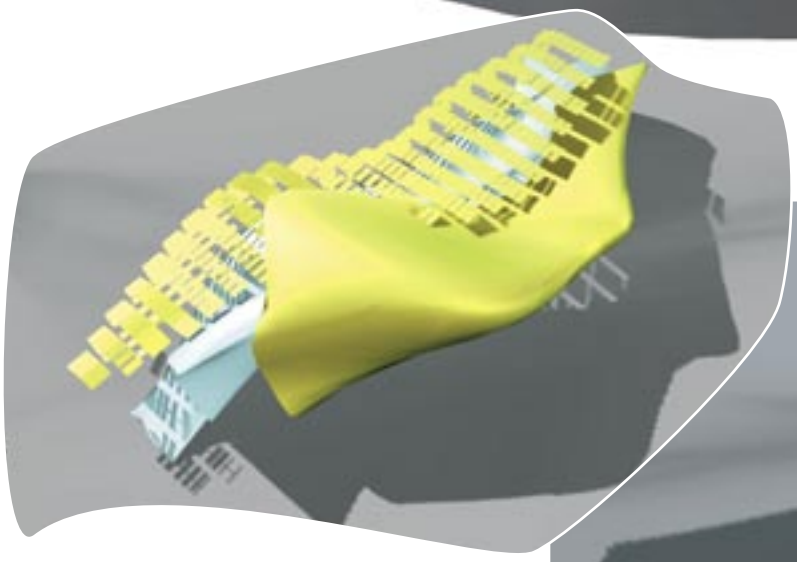
The Interstitial House is a project which seeks to examine the relationship between public and private spaces within a house. The design began with two cylinders which were representing, at a diagrammatic level, the public and private spaces. The cylinders were manipulated and studied through a series of physical models in clay and **form·Z** that examined the relationships of the two cylinders as they were manipulated and modified. It was discovered that the two cylinders, when intersected, generated an interstitial space. This intersection of the two cylinders created public-private and private-public spaces. This discovery lead to the revelation that, rather than having absolute private and absolute public spaces, a gradation between public and private spaces could be developed that seeks to push the limits of what activities society considers private and public in a house. Walls do not exist in this project in the traditional sense. Walls or partitions between spaces are created by the undulation of the cylinders, variation in heights, and floor elevations of the interior spaces. Every "room" is linked in a continuous volume by a continuous surface but maintains its own distinct place.

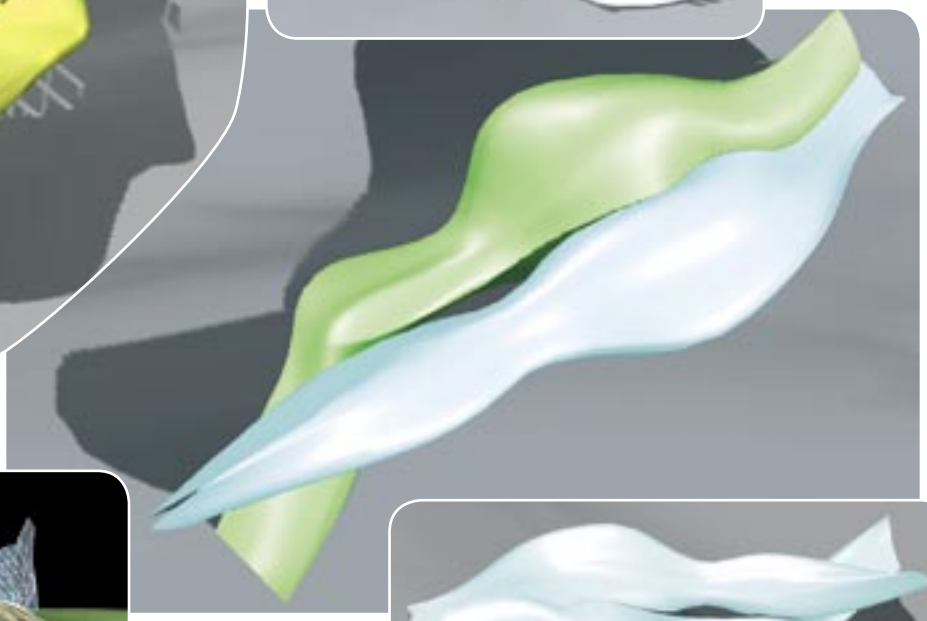


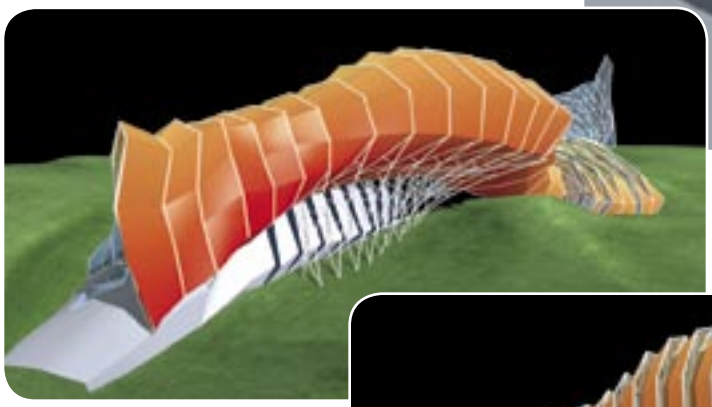
The private spaces are noted by cooler colors, while the public spaces are marked by warmer colors. The tension that exists between the public and private spaces of the house were exploited even further by defining the private spaces with transparent and translucent materials as opposed to traditional methods of making the private spaces opaque. The private space is more docile and relaxed in shape as if lying on the ground, while the public space is active and alive, entangled around the more private space suggesting that the private and public space mix. The public cylinder is mostly opaque and the only openings on the surface are the gills, which complement each other. The gills are placed to emphasize the entrance to the house and allow for guests to view into the house and residents to gaze out onto the street. The other set of gills track the path of the sun to let light into the spaces according to the time in the day when these spaces might be used. The glass structure that envelops the private spaces is designed to work with the three mechanical fins and sliding partitions. The sliding fabric partitions give the resident privacy, but also allow a silhouette to be seen from the exterior.

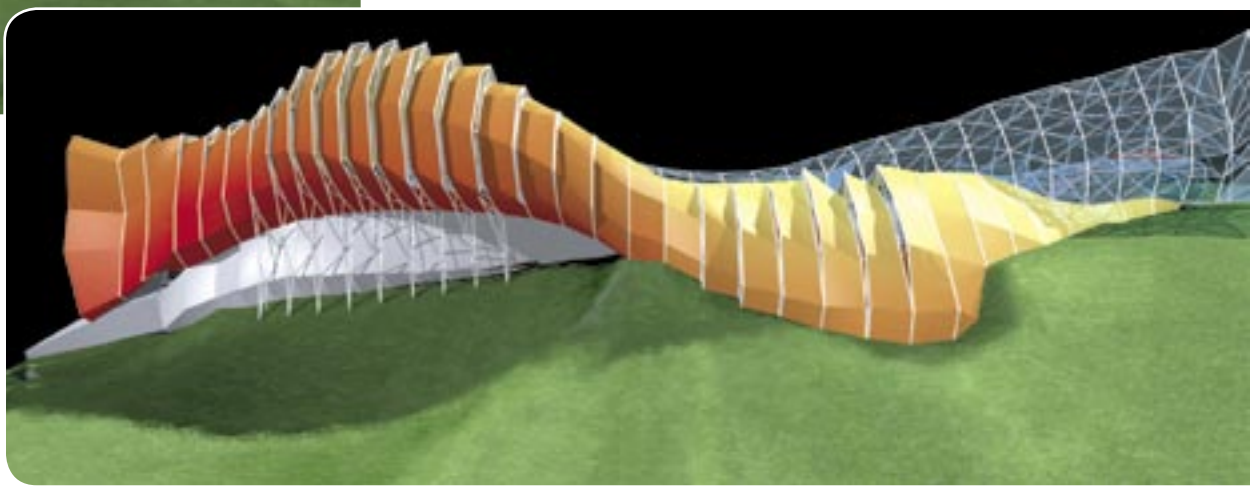
The cylinders seem as if they have emerged from the earth. The clumsy shapes were sculpted in **form·Z** through the simple pushing and pulling of vertices until the shapes sufficiently responded to programmatic needs and aesthetic desires. The shape itself that started out as a smooth nurbz surface was examined two dimensionally at sections spaced every five feet. This was done repeatedly to make sure that the two cylinders would meet seamlessly at their intersections and to insure that all of the sections worked together. The module was necessary in the transformation of the surface from a smooth surface to a facetted surface. **form·Z**'s powerful nurbz tools allowed the geometry to continuously be stripped down to two-dimensional curves and reconstructed with ease; a process that is more complicated and time consuming in other nurbs modelers.

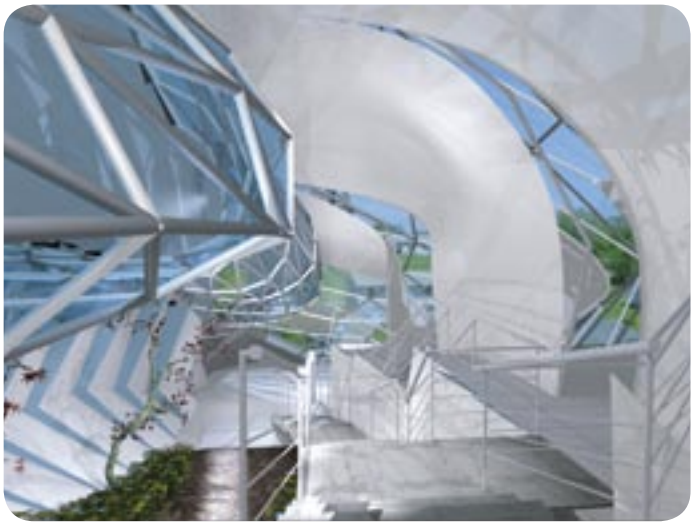


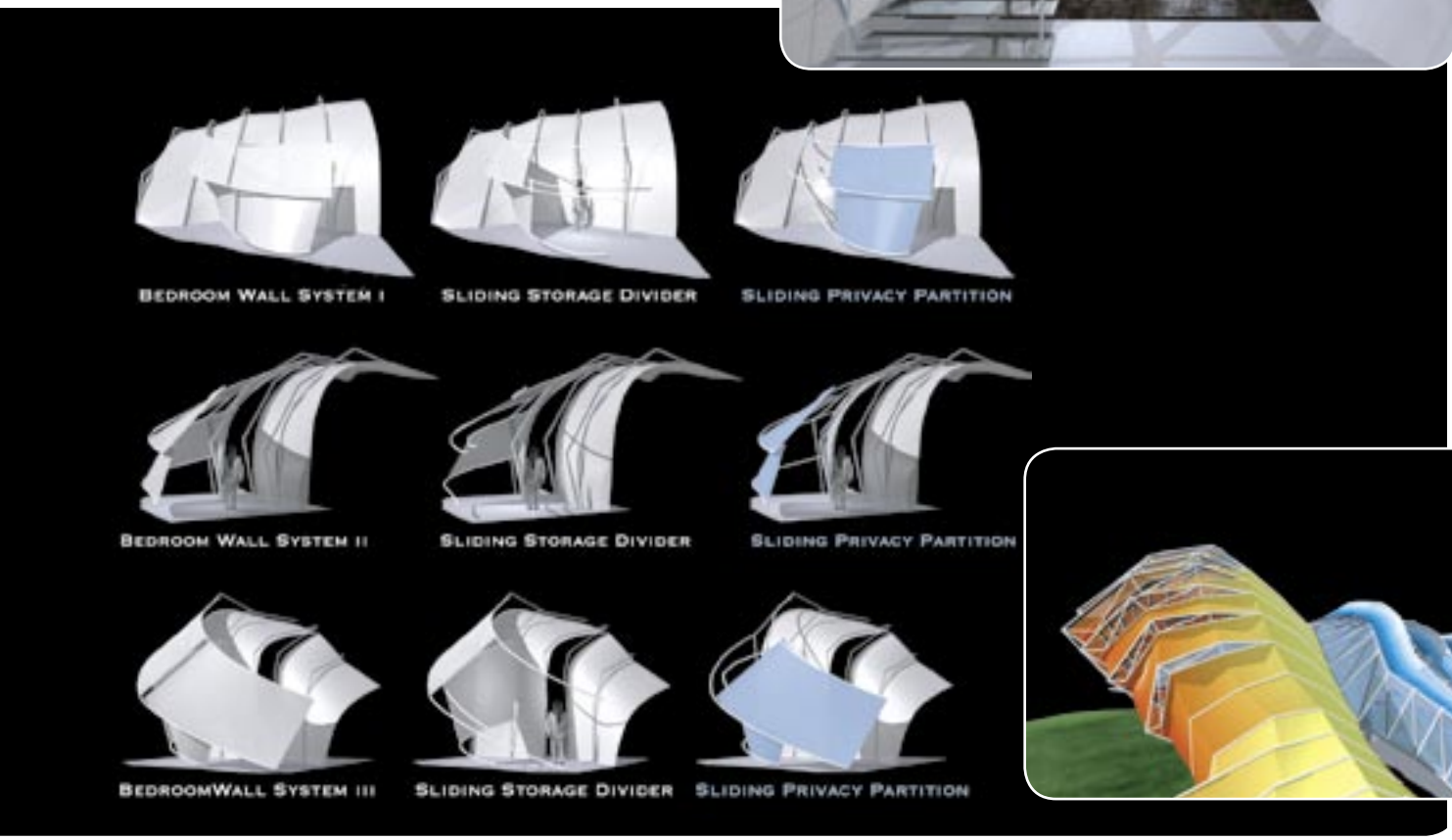


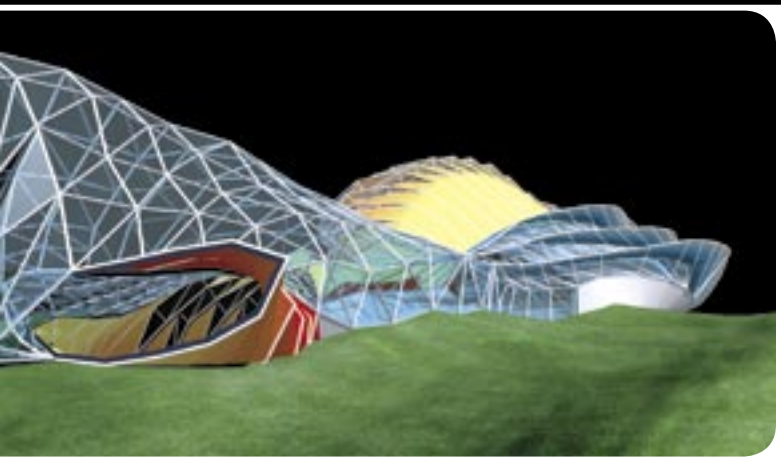


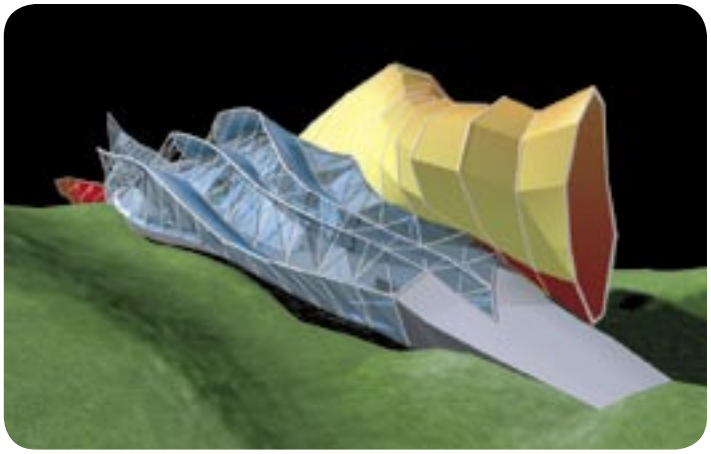







Bedroom Wall System I
Sliding Storage Divider
Sliding Privacy Partition
Bedroom Wall System II
Sliding Storage Divider
Sliding Privacy Partition
BedroomWall System III
Sliding Storage Divider
Sliding Privacy Partition





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Eugene, Oregon

World Music Center

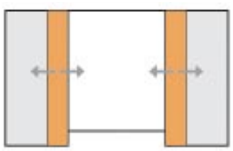
BY KONSTANZE ULLAND, GRADUATE
TERMINAL STUDIO INSTRUCTOR: HOWARD DAVIS, PROFESSOR
MEDIA ADVISOR: LARS UWE BLEHER, ASSISTANT PROFESSOR

Upon the task of designing a World Music Center for my terminal project in the architecture graduate program at the University of Oregon, I began to question the attributes of contemporary architecture in a more general way. On the one hand I wanted to create a building that would be suitable for this unique program, on the other hand I found myself wondering whether there is a certain type or a style of architecture that would be global enough to speak to people of many different cultures, while at the same time being a piece of contextual architecture.

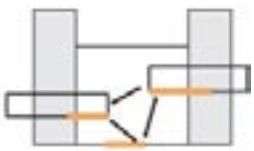
This design has become a statement of my personal conviction of what contemporary architecture should be about: First and foremost it's about space, materials, and light. I further consider it important to have an overall concept that ties it all together, while at the same time having beautifully developed details. Also, I believe it should have a contextual presence without screaming at its neighbors.

The World Music Center was defined as a cultural institution where non-mainstream musicians from all over the world might perform, interact and live for a limited period of time. Given these requirements I approached the building with a somewhat different view and did not treat it as a traditional concert hall. Since it is World Music I dealt with it in a rather casual way – as the music in its original setting is more likely to be performed out on the streets, on the public town square, under the open sky.

Out of the need to give the space life during both day and night, a very simple diagram was born:

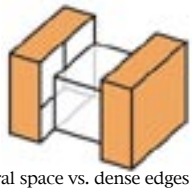


flexible zone



fusion concept

A central space that can become the performance area in the evenings, and is fed by its rich, dense edges during the daytime. The two side bars house mostly public uses, such as classrooms, café, offices, recording studio, practice rooms, and are connected to the central space by a flexible zone. This intermediate area can be counted towards either side,



central space vs. dense edges

according to the time of day or the venue. Essential are the platforms that project out into the central space and the balcony areas running along its perimeter on all four stories.

I like to think of this central space as an urban living room that is occupied during the day with areas to watch, study, and play–and when a performance takes place, the furniture gets pushed aside, the balconies turn into seating areas and the platforms into stages.

One aspect that was very important to me throughout the design, was the idea of unconventional performance practices. I envision that the space would spark a creative way of using it, e.g. having a performance that utilizes all three stages at the same time. Musicians from Africa are on the upper stage, some from Ireland on the in the middle, while a group from India is situated on the ground level. At first they would play separately, listening to each other, then they start to interact and finally their music fuses to one big piece of art. This could even involve moving through the central space and changing the stage or switching the viewing location – for both musicians and audience. By doing so the architecture can become the initiator, but can then itself pull into the background, while the idea of World Music is being expressed by spatial means: Fusion of different cultural ideas.

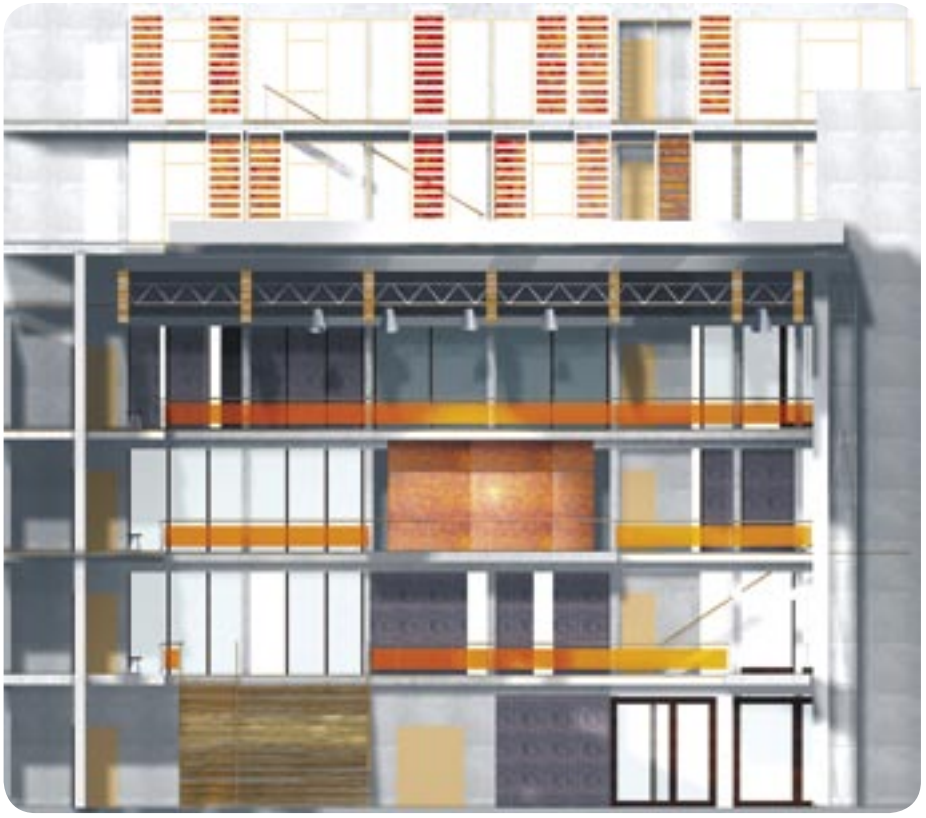
As I started out with this overall idea, it had to be carried through to the choice of materials and the design of details. In doing so, the idea of layering spaces, materials and programs became essential to the whole project. On the larger scale this meant that the basic organization of the building was layered from the South bar which houses the apartments over the shared central space to the North bar, which contains the public functions, offices and classrooms.

For the apartment side the layering technique meant moving from the wrapping circulation gallery, inwards to the apartment space, and then again outwards to a series of balconies. I designed the wall between private and public spaces to have layers of different transparency levels, such as an acoustic perforated metal wall, with an absorbing material behind, some translucent panels with another layer of textile curtains behind for privacy. On the outside façade, I intended to create a similar effect with corten steel louvers that filter the views.

For the North bar with the practice rooms, I addressed the issue of transitioning with sliding doors of corten steel, that can be opened up to the spaces behind according to the user's needs.

I attempted to carry this concept down to the scale of a balcony rail or a fixed furniture – always thinking of how to express the transition point.

As I strongly believe that contemporary architecture has great responsibility to our environment I tried to address issues of sustainability through the use of natural ventilation with a double skin facade, natural sun shading through overhanging balconies, and thermal mass by keeping spaces free from suspended ceilings. Also for a performance building, the acoustical requirements were high. I tried to address those by shaping the wall with enough larger scale irregularities to break lower frequencies, and highly textured surfaces to diffuse the higher pitches. In all of these decisions I wanted to assign a greater purpose to these details, by tying them back into the overall visual quality of the space.



Throughout the design process **form·Z** functioned as my main tool, in addition to physical models to experiment with the central space. The realistic use of lighting effects and the rendering capabilities of the software helped to describe visually what existed as an idea in my head. All the perspective renderings of this building where created by using **form·Z**, only people and some context was added in Photoshop later on.

With this design I have tried to express what architecture means to me: Creating spaces for people that are breathtaking and comfortable at the same time.

I would like to thank my terminal studio professor Howard Davis, who was a great teacher and who always pushed my ideas and without whom I could not have developed this project. Also, I would like to thank my media professors Glenn Wilcox and Lars Uwe Bleher, who first taught and introduced me to the **form·Z** software.

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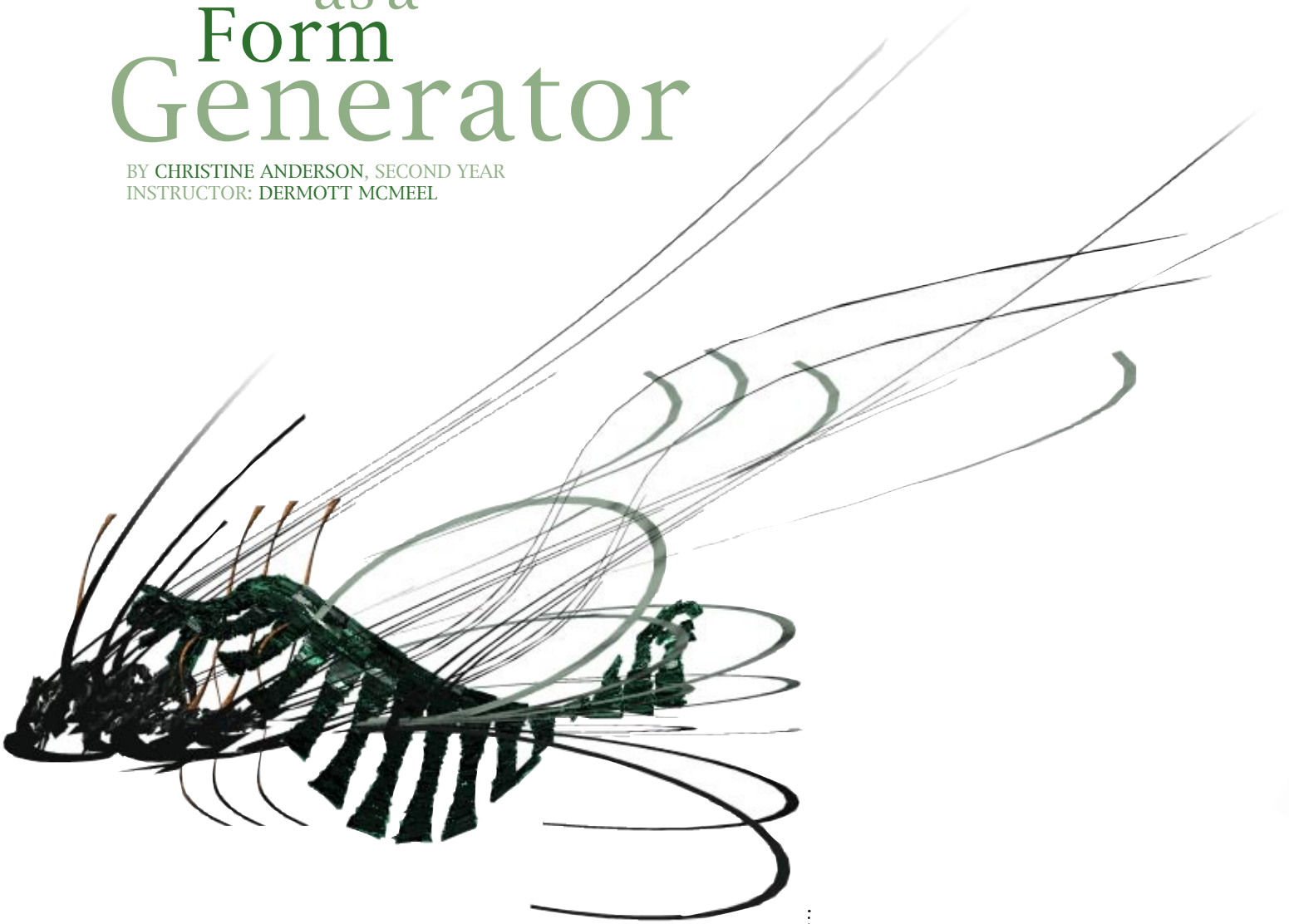
Edinburgh, Scotland, UK

Modelling Tool as a Form Generator

BY CHRISTINE ANDERSON, SECOND YEAR
INSTRUCTOR: DERMOTT MCMEEL



The programme under which this project was realised is presented in the second year of the Architectural Course at the University of Edinburgh. The project is seen as an opportunity to explore modelling software as more than an investigation or representation tool within the creative design context. Its intent is to use the modelling tool as a form generator; the modelling software and what it produces become part of the design "conversation".

The Programme

The programme was comprised of two parts: first the creation of an environment (in this case it was stipulated as a particular building within Edinburgh) and second, the creation of a "wing" with which to navigate this environment.

The Stimulus

To explore technology one should be aware of its trappings. The story of Icarus and Daedalus was used as a stimulus for the project and as a valuable lesson when embarking on technological exploration. Freedom, which is afforded by a technology, can be empowering but abuse of such technology can result in punishment of sorts.

In the same way that Icarus and Daedalus created their wing from the materials at hand, so too would we create our "wing" (the second part of the programme) from the environment created during the first part (a building within Edinburgh). How each individual interpreted "wing" was left to creative expression by the individual and they are encouraged to explore conceptual or artistic notion if they so wish.

The Objectives

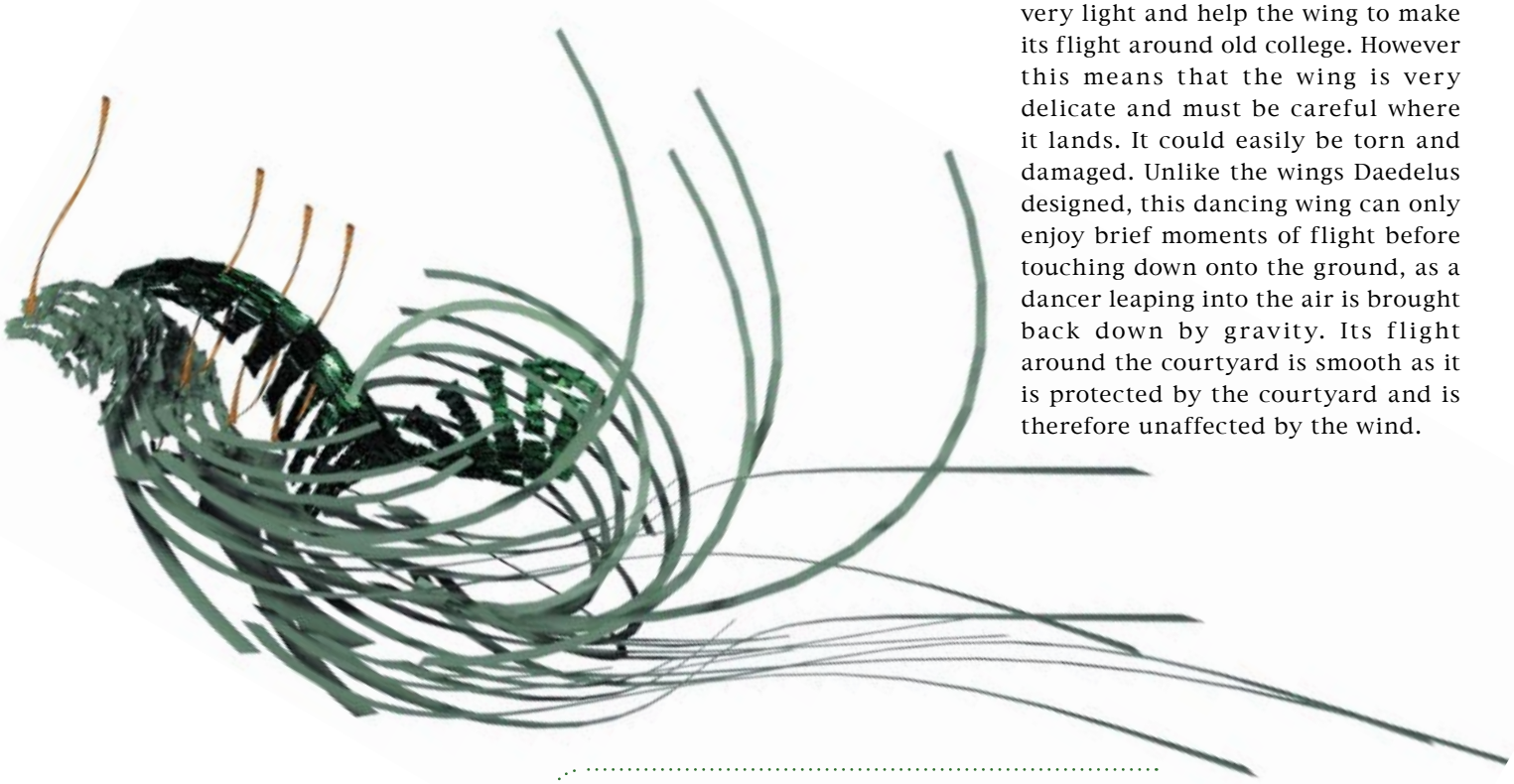
The intention was to break away from the notion (particularly prevalent within popular architectural practice) that modelling software is merely for representation. Rather than fighting with software—forcing it to represent what is in a designers mind's-eye—we encouraged the designers to work with the software and its tools and let that, in part, inform their thinking.

The Solution "Dancers"

The concept behind the design of the wing was taken from looking at the wings of a theatre, where the performers would wait to go on to the stage. The inspiration for the form of the wing came from the impressionist painting by Edgar Degas, "Dancers in the Wings".

The more dense part of the wing is the area where the dancers gather "in the wings". The wing form follows the movements of the four dancers in the painting, the green ribbons stretch from the side of the wing as the dancers leap and pirouette across the stage. The wing was modelled to be delicate and graceful, mirroring not only the smooth satin material of the dancer's costumes but also the impressionist brushstrokes of Degas.

The materials used for this wing are very light and help the wing to make its flight around old college. However this means that the wing is very delicate and must be careful where it lands. It could easily be torn and damaged. Unlike the wings Daedelus designed, this dancing wing can only enjoy brief moments of flight before touching down onto the ground, as a dancer leaping into the air is brought back down by gravity. Its flight around the courtyard is smooth as it is protected by the courtyard and is therefore unaffected by the wind.



CHRISTINE ANDERSON

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School of Architecture and Planning
UNIVERSITY OF NEW MEXICO
Albuquerque, New Mexico

Hybrid Systems: Reconstructing New Spatial Networks

BY TIM B. CASTILLO, ASSISTANT PROFESSOR

"In the data cloud of collective consciousness, it's one of those issues that just seem to keep popping up. Where did I start? Where did I end? First and foremost, it's that flash of insight, a way of looking at the fragments of time. Check it: visual mode–open source, a kinematoscope of the unconscious: a bullet that cuts through everything like a Doc Edgerton, E.J. Maret or Muybridge flash frozen frame. You look for the elements of the experience, and if you think about it, even the word "analysis" means to break down something into its component parts. Stop motion: weapons drawn, flip the situation into a new kind of dawn... It's only a rendition of Breton's dream–surrealism as a mid-summer night's scheme, check the drift in the 21st Situationist scene. A scenario on the screen: camera obscura, the perspective unbound walking through a crowd, gun drawn, firing wildly until everyone is gone... could it be another version, another situation...like the police whose 19 out of 41 bullets shot Diallo dead or the kids that walk into the schools to live out their most powerful stunningly banal lives by ending their classmates'. This is how it is in the sign of the times–an advertising link to the symbols of a lawless world, something, anything to grasp onto to give meaning to the ultra swirl...

Or something like that."

––Paul D. Miller (DJ Spooky), Material Memories, Time And The Cinematic Image

The Master Studio at the University of New Mexico was developed to allow students the opportunity to engage in self-directed experimentation and pursue the development of complex ideas in preparation for professional practice. The focus for this studio was to develop modes of inquiry that expand beyond simplistic functional practices or formalistic attitudes toward architectural space.

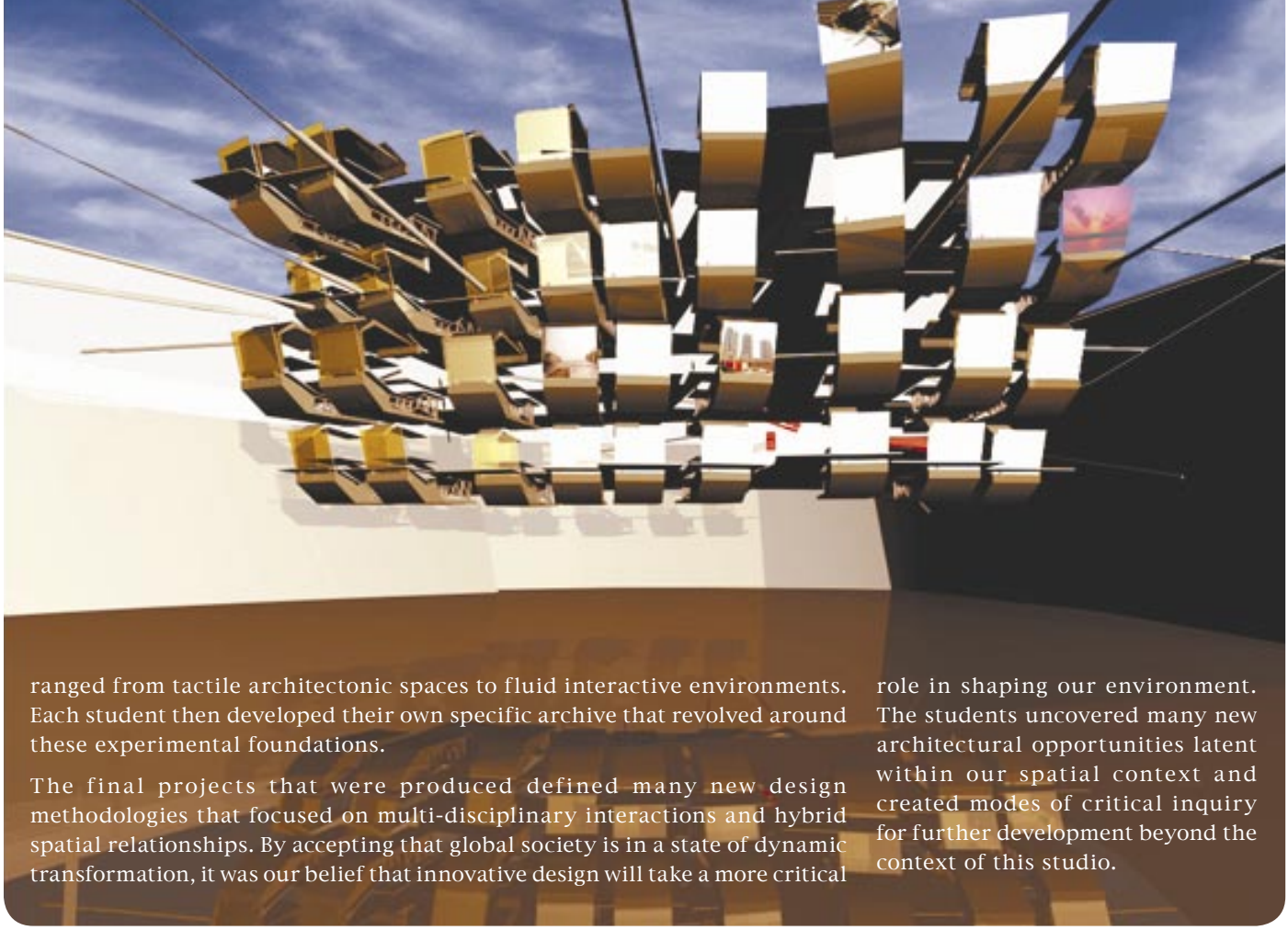
The primary objective was to design a contemporary archive and investigate how digital information redefines our understanding of this spatial entity. The archive has traditionally been a place where a body of information is stored and manifests itself in many different forms. We tend to associate the archive with museums, libraries, cemeteries and web databases. For Michele Foucault, in The Archaeology of Knowledge, he defines the archive as a conceptual structure that encapsulates a set of principles that govern adaptive organization strategies for acquiring knowledge. These adaptive strategies provide a reconsideration of new programmatic and spatial tactics that allow for the dissemination of information transference.

The studio brief called for the design of the Canadian Music Hall of Fame and New Music Laboratory in Toronto, Canada. This framework was intended to allow the students the opportunity to critically examine the impact that digital information is having on contemporary culture and investigate how it begins to reconfigure architectural spatial conditions.

This research began by searching for parallel precedents that focused in on the realm of electronic music where many artists have challenged traditional musical structures and created mutations generated through digital applications. By looking into the music of Kraftwerk, Derrick May, Dj Spooky, and abstract visions of Phillip Glass, the students began to understand how these musicians utilize technologically based strategies for creating new poetic compositions.

This studio then began a series of experimental exercises that allowed the students the opportunity to explore new spatial and informational strategies for design. The nucleus for this experimentation revolved around a digital to analog foundation that was developed by Dr. Julio Bermudez and Bennett Neiman, utilizing a four-stage transformation process of altering between analog artifacts and digital simulation. The experimentation began with a series of analog models that were developed on hybrid observations (digital and virtual) found in our environment. This exercise was influenced by texts of several authors including works by Walter Benjamin, Gilles Deleuze, Paul D. Miller and Paul Virilio. This theoretical dialogue influenced the students to reconsider traditional design methodologies and search for new applications for these hybrid spatial systems.

The spatial data was then translated into **form·Z** where a series of digital models began to probe for spatial trajectories that could be further developed programmatically. The complexity of the systems that emerged focused on relationships of networking, time, and spatial sequencing. These principles became the foundation for a series of performative structures that

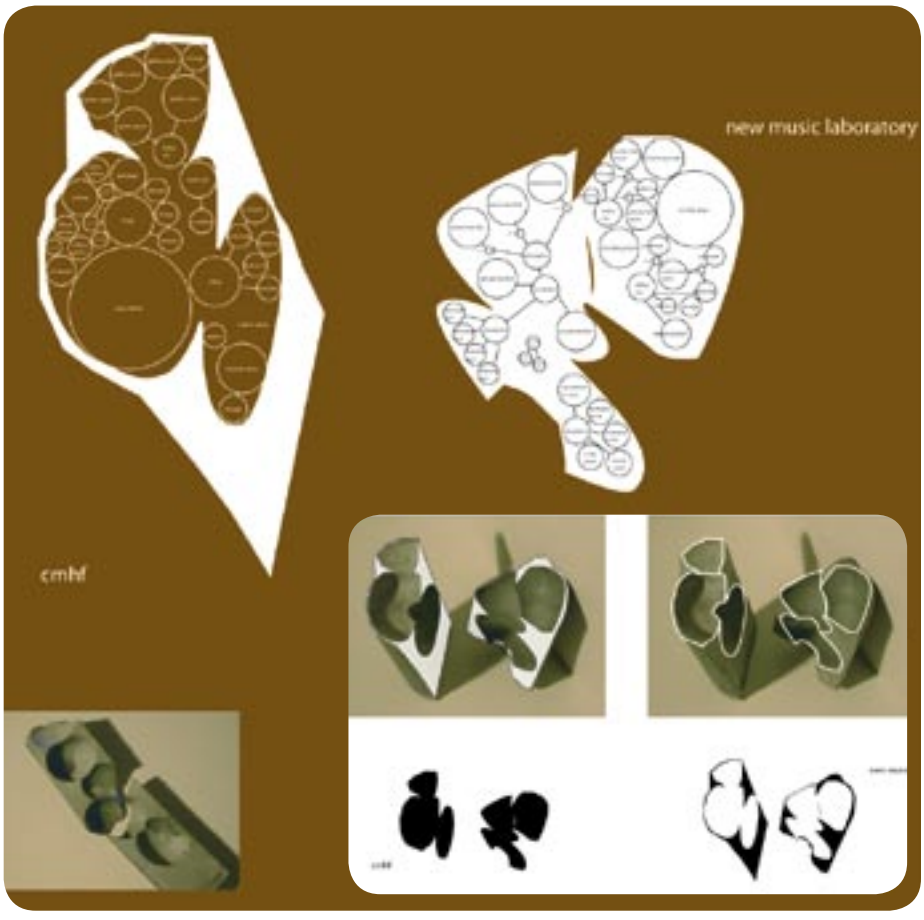


ranged from tactile architectonic spaces to fluid interactive environments. Each student then developed their own specific archive that revolved around these experimental foundations.

The final projects that were produced defined many new design methodologies that focused on multi-disciplinary interactions and hybrid spatial relationships. By accepting that global society is in a state of dynamic transformation, it was our belief that innovative design will take a more critical role in shaping our environment. The students uncovered many new architectural opportunities latent within our spatial context and created modes of critical inquiry for further development beyond the context of this studio.

DERRICK BALLARD

ALYSSA SHAPKOFF



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Albuquerque, New Mexico

The Reliquary

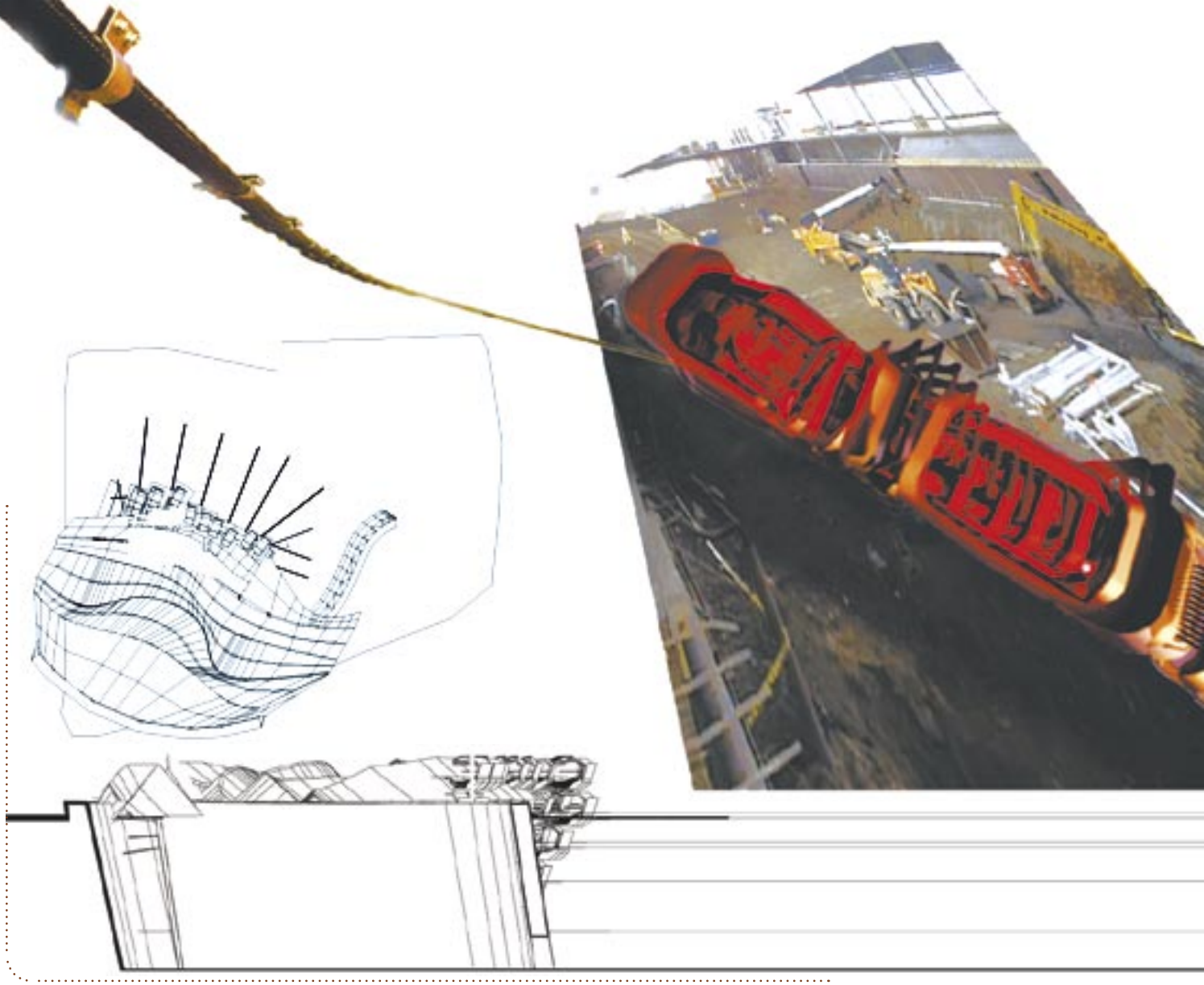
BY DERRICK BALLARD, SIXTH YEAR
INSTRUCTOR: TIM B. CASTILLO, ASSISTANT PROFESSOR

Higher orders of architectural communication and discourse are needed. We need to be having the practical discussion of space and spatialization, concept and realization, circumstance and translation. These will divorce us from the evaluation of 3 dimensional graphic representation (physical and/or digital model, or hand drawing) as a discussion of architectural experience. The graphic expressions will be provided for us as digital abstractions of circumstantial material. It is ours to observe, account, translate, and investigate. The evidence of a happening, the concretized expression of event, and the allowance to transcend that experience by making it known, is the sparking of curiosity inherent to the basic human condition. It does us no good to discuss the obvious, only what could be possibly meant by its existence and what it might mean for us as an experience.

STRUCTURAL FRAMEWORK

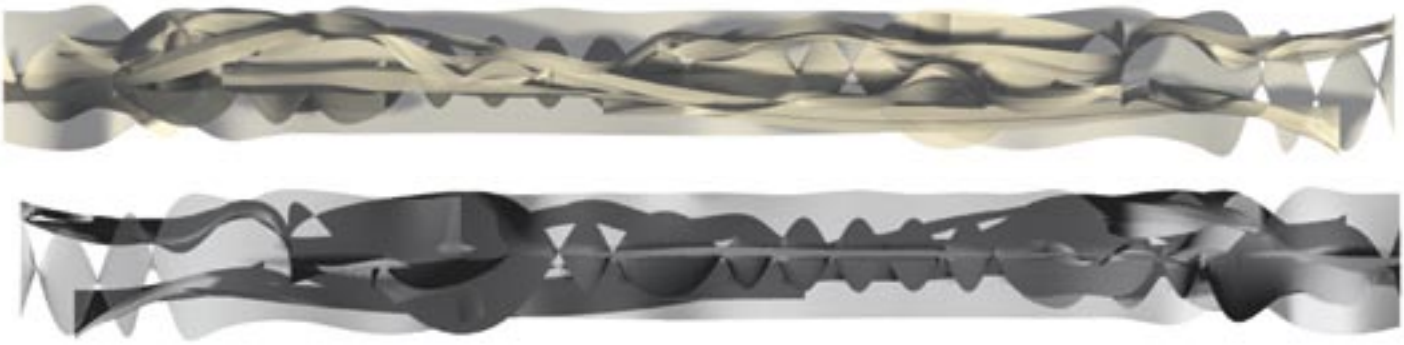
The digitization of the world is the infinite enumeration of perceivable and imperceptible circumstance. It is the religious value of experiential comprehension made manifest through modern or contemporary technologies, it has always been so. Since Adam, man has been holding an accounting of his reality in order to establish it as such, and to identify his place within it.

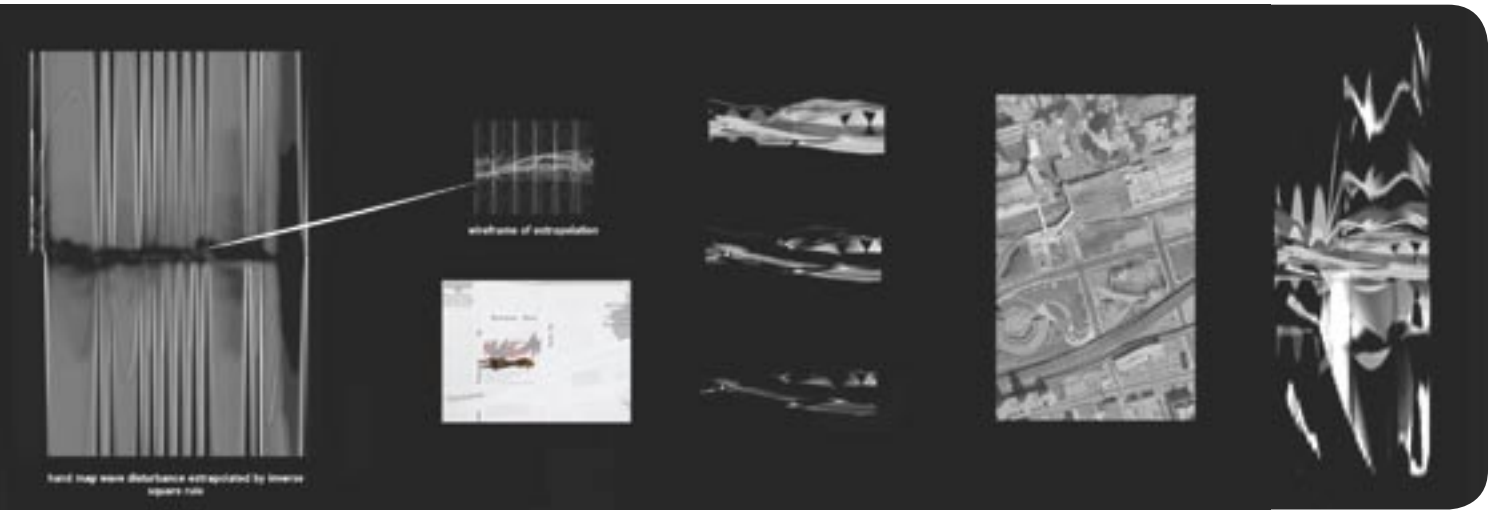
In my sense, the project is a CMHF/experimental music opera house pursuant towards a very particular mode of ontological order and architectural making, or process. It involves specifically the digitization and phenomenology of spatialized sound as experiential and architectural materiality. It is the emancipation of music from apparent sound, and its architecture's subsequent emancipation from the building, both to be reconciled as interpretive systems of communication and integration. The present results of which are mediations and formal manifestations of occupiable indices. Indexical sign, prosthetic awareness, sensory substitution and synasthaesia; all of which are parallel systems of communication, trading experience for experience as a means of translation. The perfection of which is a language in which, one does not ask, "Do you know what I mean?" It itself IS the meaning. The context and the meaning are symbolically locked in order to reveal an expression of an invisible reality that appeals to the inquisitive nature of man. The technological index of making provides the what, the algorithm provides the religiosity of how, and the devoted practice of it elevates and instigates the communication of higher dimensional orders outside of our "normal" translation of experience. The romantic proposal for architecture is Occupiable Index, the context and the communication of meaning, both resident and made perceivable and translatable within the system of its own becoming. The engagement of the rip and tear process

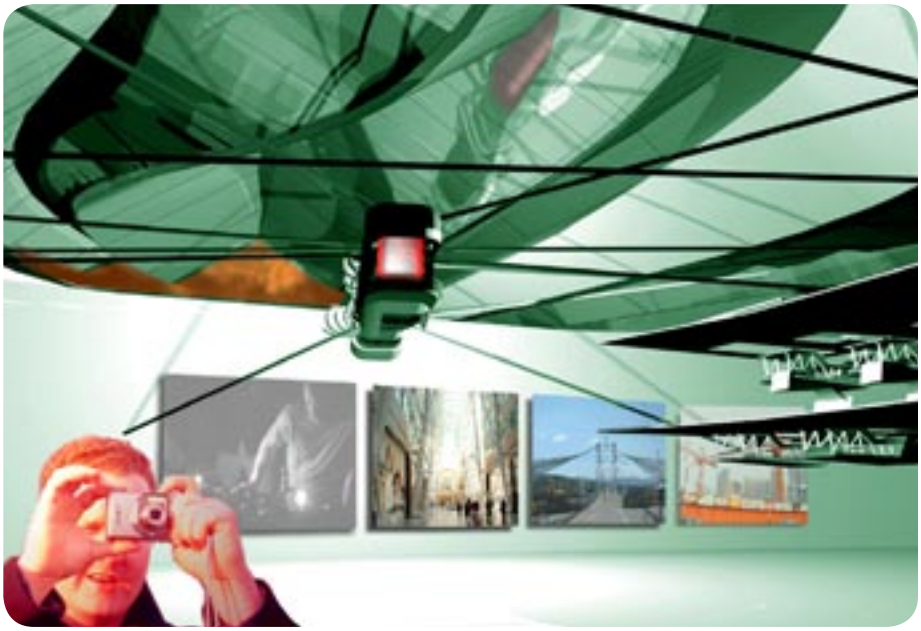


suggests a totally heuristic reading of the site as circumstance and chaos are the raw materials we use in order to construct and communicate order. It is not about the justification of aesthetics, although this justification is inherent in the process, but it is about the communication of intent and the translation and revelation of circumstance greater than, and adjacent to, ones present reality. The existence of a CMHF is to create the opportunity for romance. The city of Toronto presents itself as a virtual dance hall for the harmonic interaction of technology and circumstance. The rhythm, or the mantra is expressed by the building's full extension into the landscape, the deployment of information collecting probes. This allows for cognitive communions across the city and its soundscape through various and unrelated recognitions of samplings of the architecture that have advanced themselves, mobilized themselves as collectors, translators, and purveyors of information, ultimately condensed and redistributed at one point of dissemination. This point is called the communion. The technology expressed with and without the architecture is ultimately for the purpose of unification, and the architecture is its chosen instrument of communication. If, in our age of information, it is true that form follows feedback then the shape of the city changes dynamically with the installation of such a project. The city changes in a manner that renders change itself dynamic. The imperceptible becomes palatable and the architecture culminates in its essendie as sheer sensation. The spatialization of the architectural musical reference is bound in the romantic ideal of he city as it pertains to each one of us individually. Each Tuesday, Thursday, Friday, and Saturday night we are treated to a concert of convergence, the spectacle that is the dynamic of our immediate environment both perceptible and imperceptible. An awesome accounting of our physical and digital selves being condensed, compressed, interpreted and finally re-communicated as pure music, the romanticized universal language. This project is a romance novel, a story, if you will, of a love affair between our race towards our highly advanced technological selves and our love of that pursuit. Somewhere between site and circumstance, desire and consequence....the dance begins and we are already caught up in its embrace.

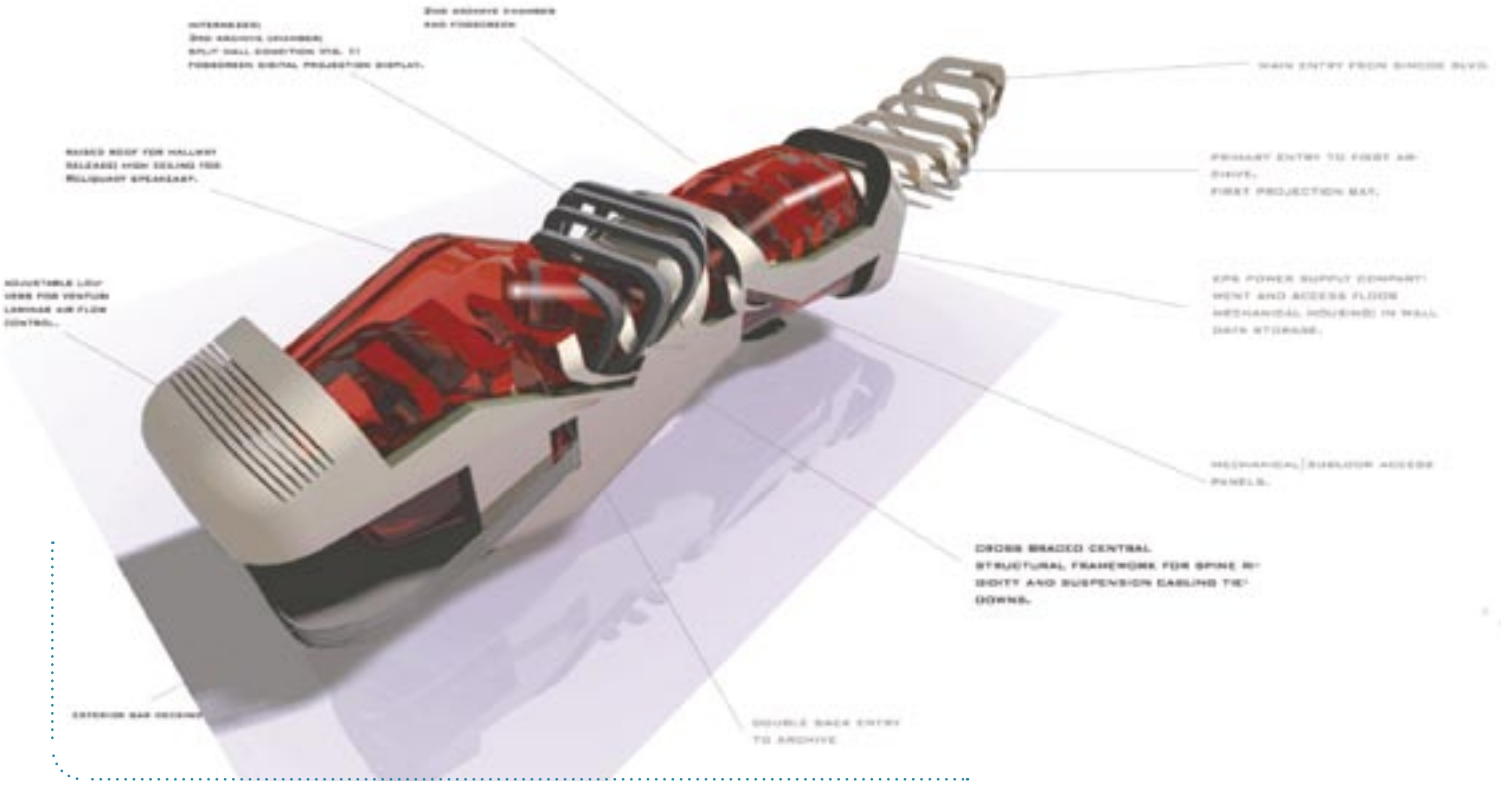
Within that embrace we find the mantic whirl of the virtual dervish.








HYDROFORMED
TITANIUM
BANDING
POLYMER CONCRETE FRAMING
IMPREGNATED
AEROGEL
COMPOSITE


MAIN ENTRY FROM SIMCOE BLVD.
PRIMARY ENTRY TO FIRST AR-
CHIVE,
FIRST PROJECTION BAY.
EPS POWER SUPPLY COMPART-
MENT AND ACCESS FLOOR
MECHANICAL HOUSING IN WALL
DATA STORAGE.
MECHANICAL/SUBLOOR ACCESS
PANELS.
CROSS BRACED CENTRAL
STRUCTURAL FRAMEWORK FOR SPINE RI-
GIDITY AND SUSPENSION CABLING TIE-
DOWNS.
DOUBLE BACK ENTRY
TO ARCHIVE

Facultad de Arquitectura
UNIVERSIDAD FRANCISCO MARROQUIN
Guatemala City, Guatemala

Master Plan La Aurora

HONORABLE MENTION IN URBAN AND LANDSCAPE DESIGN

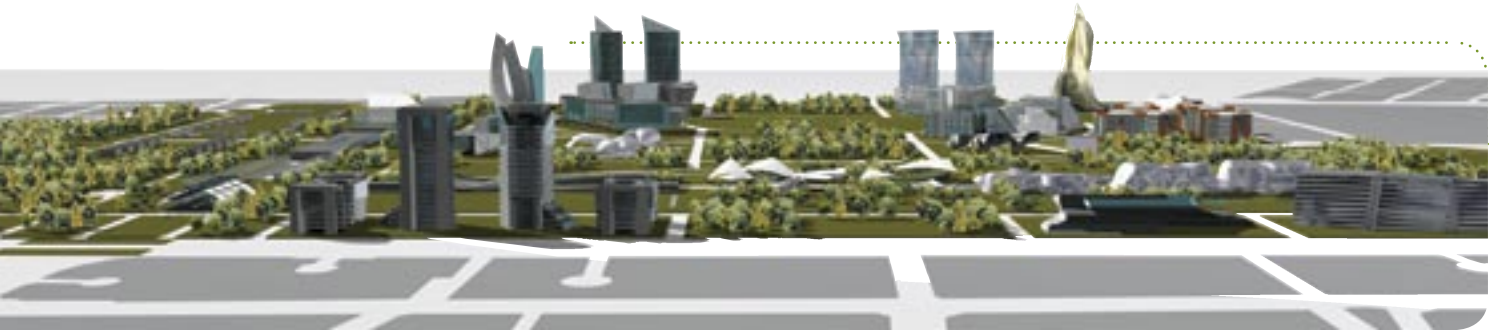
ALSO SEE PAGE #7.

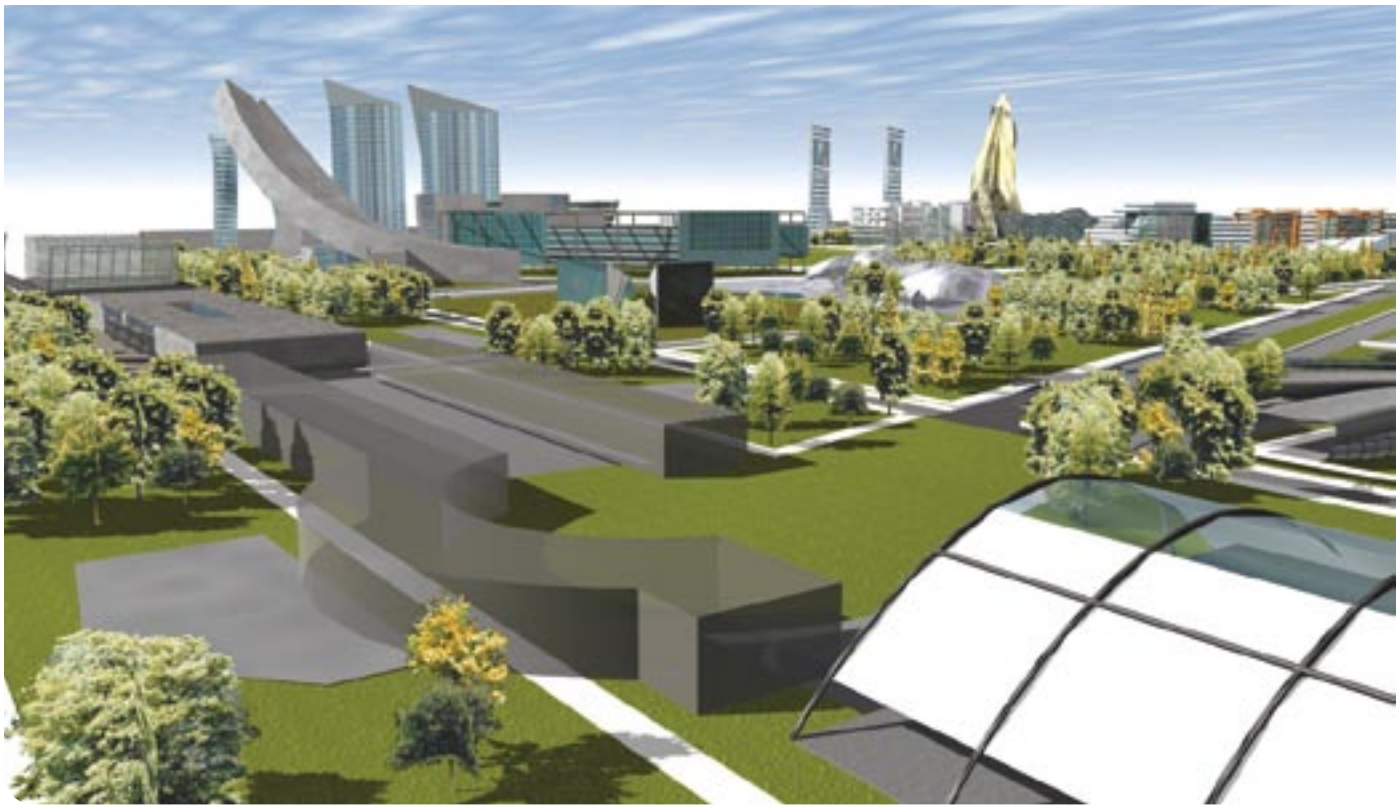
BY LUIS FERNANDO CALDERON, GIACOMO BILZ, LUIS PEDRO BROL, ANTONIO ARROYAVE, RODRIGO CABRERA, CARLOS HERRERA, AND RICKY TITUS, 9TH SEMESTER
INSTRUCTOR: DAVID GARDA, PROFESSOR

La Aurora is an area in Guatemala City where the International Airport, the City Zoo, the Archaeology and Art Museums, and an abandoned horse race track, are located. Originally, this was a suburban area that has, for many decades now, been surpassed by the city. Given the hazard of having the airport right in the middle of the city, there are recent plans to relocate it to a remote location.

Assuming that the airport is relocated, the students were to propose a master plan for a mixed-use, high-density development that would bring new life to the area. Each student had to prepare an individual proposal for the master plan resolving for vehicular circulation, program distribution, contextual connectivity and visual image. A review of the seven proposals, by a jury, allowed the students to identify the strengths and weaknesses each of them had. After the jury review, a final master plan was developed as the result of merging the top three individual proposals.

One of the considerations of the master plan was to leave a small, one-runway airport for private planes and domestic flights, both as a desirable feature and as a reminder of the original use of the site. This small airport played a key role in determining the





location of high-rise buildings within the development. Building height was established by the distance from the site to the runway; allowing for taller buildings on sites farther away from the airport.

The urban fabric consisted of an orthogonal grid with the same orientation that most of the city has. The footprint of the horse racetrack was incorporated as part of the fabric, defining an urban park around which higher density buildings would be located. A diagonal street, dividing the grid in two sectors, was introduced with the intention of making it an important artery. The lower levels of buildings along this diagonal axis were destined for commercial use to promote the creation of a commercial strip. In order to encourage diversity, a mixture of residential, commercial and office use was permitted.

Cultural buildings were located in the same sector of the existing museums and the zoo. Recreational areas, including parks were distributed evenly; with a large urban park located near the center of the development. The idea behind this was for the users to perceive the development as a large green area to compensate for the lack of urban parks in Guatemala City.

Once the master plan was defined, each student selected a site to design a particular building. They had the freedom to select the type of building to design and the architectural style to follow. The only restriction was a material and color code to which all of them should comply.

Individual building proposals ranged from traditional to avant-garde digitally based architecture. It was interesting to discover the variety of design theories, methodologies and software employed by the students for their individual projects. **form·Z** was used as the main 3D modeling and rendering program where all the pieces came together for final assembly of the building complex. The master plan layout and most of the buildings were modeled with **form·Z**. The buildings that were not modeled in **form·Z** were seamlessly imported into it. Each individual building was integrated to the master plan as a symbol definition to reduce the size of the master plan file and to facilitate building modification. In this way, each student needed only to modify the symbol definition of his building and then the new version would be automatically loaded into the master plan. Managing the project in **form·Z** was also fundamental to maintaining a uniform material and color code.

form·Z's versatility and diversity of tools allowed the students to produce building designs ranging from conventional/ orthogonal to complex and freeform structures. Among the modeling techniques used for individual building designs are:

- The use of macros to simulate and record sequences of transformations in order to generate new forms. Since these operations produce variations of a specific object, the results are patterns of superimposed objects similar to those produced by fractal transformations.

- The use of metaballs to produce isomorphic polysurfaces or BLOBS. Both positive and negative weights were used to explore how objects and forces could influence and effect other objects, within a formal composition and context.

- The use of NURBZ tools to generate free form surfaces and spaces. Unfolding and self-intersecting surfaces were generated to explore the possibilities of continuous space through "bubbles" and seamless integration of the horizontal and vertical planes.

Dynamic animations using Alias' Maya were then used as abstract and generative machines, with the purpose of deriving form from digital animations (digital morphology). These generative machines consisted of different dynamic techniques to conceptualize and to materialize forces to identify the centrifugal force of the site, to relocate the centrifugal force to the site to superimpose the centrifugal forces, and to find the convergence of the forces in the site, among others.

After incorporating all the individual buildings produced by the students into the master plan, it was interesting to contrast those produced with conventional design processes and those produced with computer-driven generative processes. Regardless of the complexity of form and program, **form·Z** provided the students with all the tools needed for creating and manipulating their models from conceptual to final design.

Learning How to Give Meanings to Geometrical Objects in 3D Virtual Space

Department of Architecture
TAMKANG UNIVERSITY
Tanshui, Taipei, Taiwan

BY CHEN-CHENG CHEN, ASSOCIATE PROFESSOR

Figure 1

PEI-HUA CAI

When students complete their fundamental design at their freshman year of Tamkang University, their small-scale building designs at the sophomore year, and medium-scale building designs at the junior year, they can join different design studios depending on their interests at the senior year. The "Information Technology in Architecture" studio is one of the nine design studios in our senior year. The major purpose of the "IT in Architecture" design studio is to utilize 3D computer-aided drafting software to help students experience the designed space directly through the whole design process.

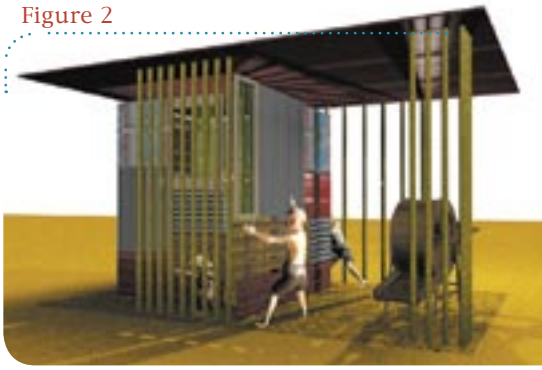
With the computer graphics software available today, it is not difficult to form different shapes on the screen. However, when combining those shapes and augmenting them with textures, we start to realize the idea of "designing." It is quite interesting and it is also a challenge for students to learn how to combine 3D geometric objects together in the virtual space and to give semantic meanings to those objects.

The volume of buildings we designed previously in this design studio were quite huge. More recently we have changed the scale of the assignments the students have to design to several small buildings. There are five main reasons for doing so: (1) Increase the students' abilities to design different forms. (2) Learn how to apply the meaning of design to different geometric forms. (3) It is easier to attempt a smaller scale design. (4) Explore the association between small-scale works. (5) Small scale urban design is an important aspect that a senior student must explore.

The "IT in Architecture" design studio had seven students in Fall 2004. The assignment of the studio was "e-Boxes". The original thought of this assignment was to let students find an English keyword starting with "E" that expresses his attitude towards Taipei city. Then, he were to insert at least six different e-Boxes into a site in Taipei City in a manner consistent with the meaning of the keyword selected. The purpose of inserting those boxes into the urban space was to turn the monotonous city into a more pleasant space. Beyond this task, we hope that students can start to learn how to observe urban phenomena, to discover their views towards the city, and to be able to elaborate on the urban conditions of this information era. At the end of their designs, students had to come up with titles for their projects. Some of the topics students selected were: Red Cross on the street (Figure 1), on the way back from school (Figure 2), virtual and real computer stores, escape from the city, facilities of relaxation in the office, six ways to observe the Taipei 101 building, and looking for the Christmas trees.

We did several warm-up design exercises before the "e-Boxes" assignment. The entire assignment took about two months. During the last 3-4 weeks, most students have already decided on a topic and are working hard to finish their design directly in **form·Z**. Teachers who participated in the design evaluation were satisfied with the students' performances. At the same time, students were also quite proud of their work. These results have shown that the difficulty of this scale of projects was just right.

Figure 2



YANG-HANG YANG

This year at 2005, besides continuing the operation of **form·Z**, we also asked students to transform their 3D works into 2D drawings. With the assistance of laser cutter and CNC technology, we can layout all the components of the 3D designed objects into a 1:1 ratio. The following two articles written by Ms. Chen and Mr. Lee, two students from my design studio, describe their works and lesson learned.

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Escape from the City

BY TZU-YU CHEN, FOURTH YEAR
ADVISOR CHEN-CHENG CHEN, ASSOCIATE PROFESSOR

CONCEPT:

Linsen N. road, a fantasy area of nightlife in Taipei, has all the pubs, beer houses, hotels, and motels. Living in a flourishing but crowded city such as Taipei, people tend to look for their liberation at night, for release from the pressure of a whole day's work and the pressures of the real world. This design looked to establish several escape scenes from the nightlife of Taipei.

Following, the space will be described through the use of a time map:

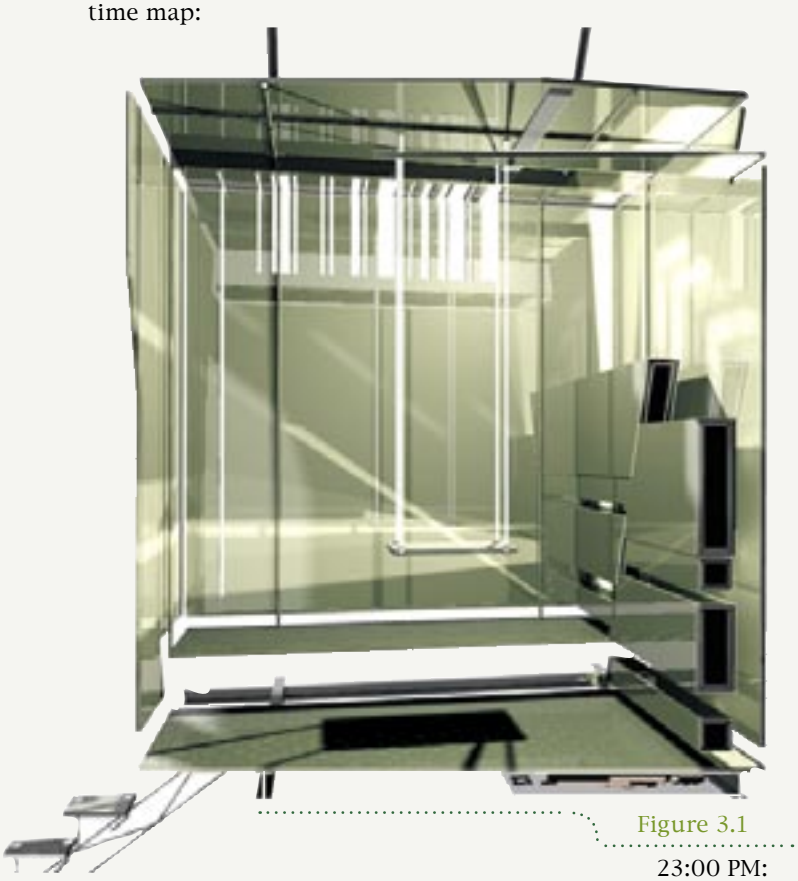

Figure 3.1

23:00 PM:

The metal box (Figure 3.1): At the closing time of a shopping mall, open the window and walk toward the balcony, walk into the metal box to condense. I used stainless steel (material) and sounds (immaterial) for the metal box. The metal and sound agitate each other, let the metal echo the sound of the surroundings, enlarges all the noises and the quietness.

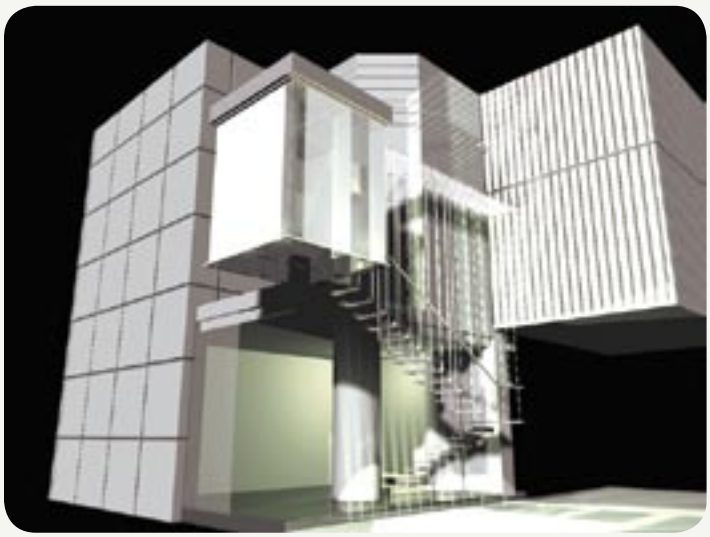

Figure 3.2

23:30 PM:

The high view deck (Figure 3.2): We suspended a plate form in one of Linsen N. road's buildings, took away the ground level so it can look down at the entire nightlife playground. This work emphasizes the use of glass and light to exhibit a light volume. Lights will reflect, shine, or disappear through the glass stairway to make a suspending surreal sensation.

Figure 3.3

24:00 PM:

The food stand (Figure 3.3): Have some food before you go to a party. These stands, scattered between pubs inside alleys, emphasize the use of lumber, sand, and time, using the food stand as the clock of the virtual realm. A reminder of the flow of time while at play.

Figure 3.4

00:30 AM:

The wine shop (Figure 3.4): Emphasize the use of fabric and smell. Pick up a bottle of wine and drink it at the corner–an unstable shacking sensation created by a fabric-surrounded space, just like the feeling of being slightly drunk. It will give you a feeling like whiskey with ice in the space.

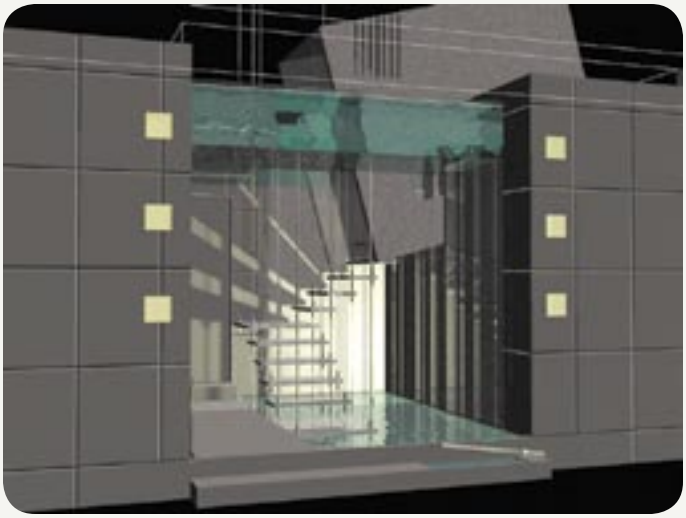

Figure 3.5

01:00 AM:

The pub (Figure 3.5): Emphasizes the use of stones and water. This is a rest area for drunk people. It is surrounded by water next to the hallway and implies a calm feeling.

Figure 3.6

03:30 AM:

The hotel (Figure 3.6): Emphasize the use of glass and steam. Use the frosted glass and water to adjust the room temperature to create the fog on the glass. This indistinct feeling blurs the edge between private and public spaces. The rhythmic timing made a rest out of this space.

EXPERIENCES FROM THE DESIGN STUDIO:

This design studio is attempting to operate the design tools differently from the other training I had in other design studios before. Usually, we treat the 3D model as the last stage of the design; however, in this studio, we do the design in 3D space at the very beginning of the design process. This helped me to break through the old manner of 2D thinking, starting in the 3D space with ease. It is also great that, whenever there is a conceptual design, it can be traced out right the way, increasing the opportunity of finding the problem and fixing it. Also, because of the high visibility, it makes the design process just like sculpting. It increases the opportunity to discuss the fine details and interior atmosphere during the design process.

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Facilities of Relaxation

AWARD OF DISTINCTION IN INTERIOR DESIGN

ALSO SEE PAGE #8.

BY PO-YI LEE, FOURTH YEAR
ADVISOR:CHEN-CHENG CHEN, ASSOCIATE PROFESSOR

Office workers have quite repetitive days in general. I have chosen an eye catching building in this dull city. Inside and around this building that looks serious, I set up the colorful boxes that I designed, hoping these remedies can somehow relax this intensified city. I have set up six spaces for office workers to enjoy and improve the quality of their daily life. Life can be better, can't it?

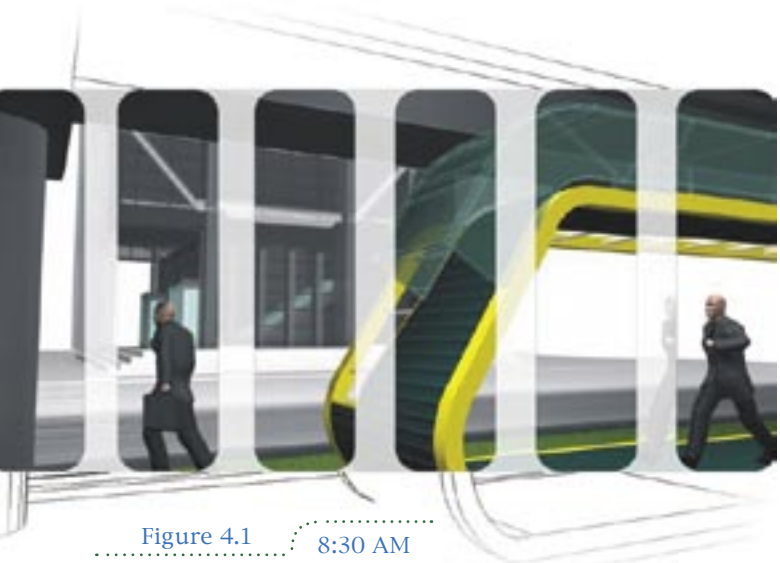

Figure 4.1 8:30 AM

With a heavy briefcase, one walked out from the subway and found out that there's a conveyer (Figure 4.1) near the station. He put the briefcase on the conveyer to let it move along and started to walk on a moving strip under the conveyer. The strip he walks on is moving in the opposite direction; this means he has to walk twice as fast to move ahead. This resembles the struggle and difficulty on the way to work. In addition, as he walks on the strip, the exercie makes him feel energetic and starts to wake him up, getting him ready for the work of the day.

Figure 4.2 8:45 AM

Everybody is gathered at the front door of the company. Step up to the platform (Figure 4.2); let us start the day with our slogan, to promote our morale. You can also tell all your complaints or confess to the ones you love.

Figure 4.3 10:00 AM

Beside the washroom, perhaps the file room is the only place where he can go to have a little break. While he was on the way to the file room (Figure 4.3), he met her. They had an unspoken understanding to meet here. When he talkes to her through the semi transparency of the digital file room, it is his happiest time of the day.

Figure 4.4 11:30 AM

Concentrating on his screen, the screen saver (Figure 4.4) software displays several little figures that are doing gymnastics and Taichi, which reminds him to do some exercises, because he sits in front of the computer too long. At the same time, the camera transfers all the exercising scenes to the front door, to remind people not to slack off.

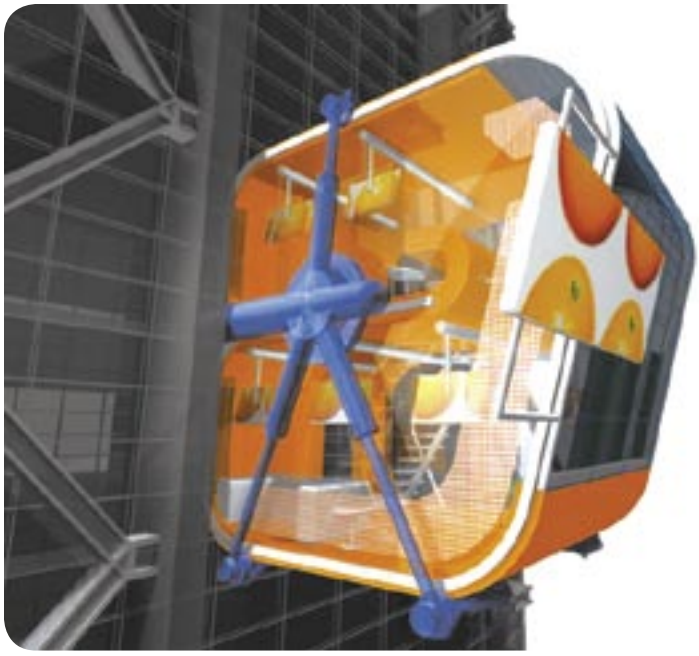

Figure 4.5 12:45 AM

He just had a greasy lunch and is now hoping to have a healthy juice to clean up his intestines. He ordered a wheat-grass juice from a bar (Figure 4.5); he grows his own wheat-grass in his office. The bar is like a vending machine, moving up and down through each floor.

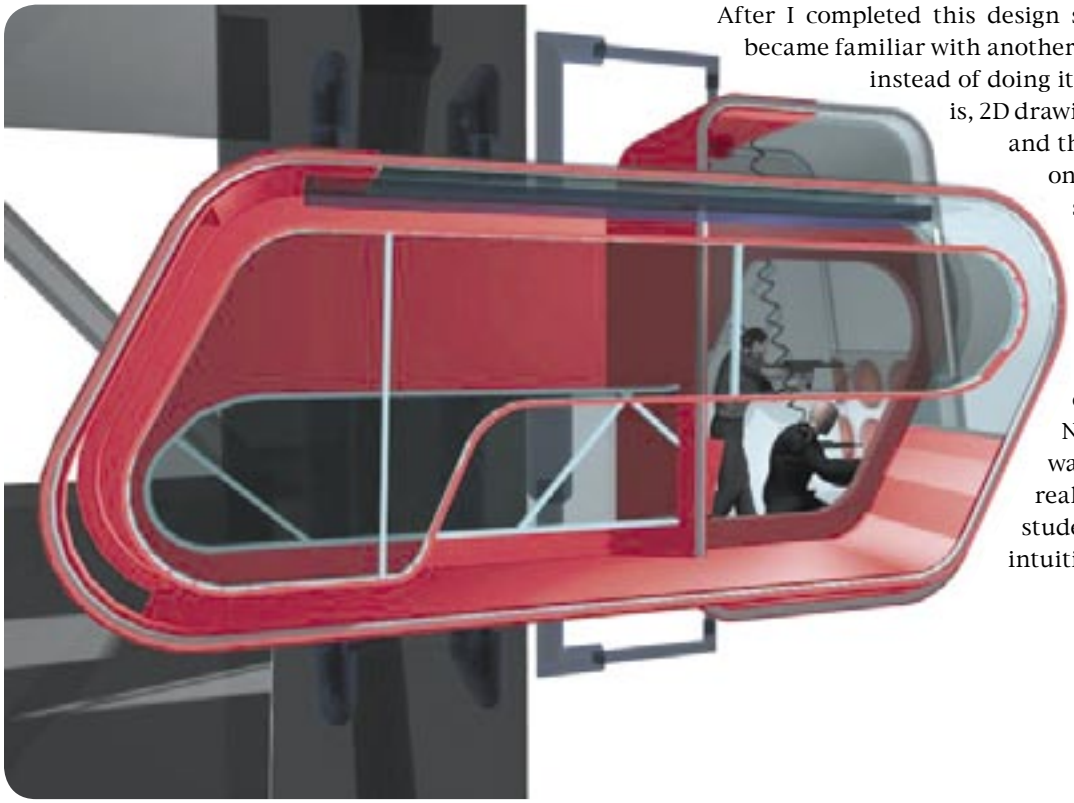

Figure 4.6 15:40 AM

Finishing the review meeting; the boss was not happy about it. There are a lot of emotions to let go. Walking into the shooting field (Figure 4.6) and picking up the squirt gun, he targets the moving subway cart and shoots the cart just like in the shooting games.

Figure 4.7 ADDITIONAL

Wealthy bosses always go to a gym for exercising, but I think if you need exercise it has to be in the outdoors. Why lock yourself in a room just like the rats, which play with their wheel (Figure 4.7)?

CONCLUSION

After I completed this design studio, I learned about and became familiar with another way for approaching design, instead of doing it in the traditional way. That is, 2D drawings first, then the elevations, and then the cross sections, which only allow you to imagine the spaces. When using **form·Z**, we can construct a simple computer model which allows us to experience the space quickly and to feel the different textures of the different spaces. Now, I have adapted to this way of designing and I find it really helpful, especially for students like me who rely a lot on intuition.

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Digital Modeling for Fabrication

BY BRAD JIRKA, ASSOCIATE PROFESSOR

At MCAD the creative process always seeks a balance between concept and execution. Within the Sculpture and Furniture programs this approach results in students that are skilled makers creating works that reflect a conceptual understanding of the concerns of the object, space, content, and context.

Computer modeling, and specifically **form·Z**, has been a key component of MCAD's 3D programs in Furniture and Sculpture for over a decade. Originally adopted to aid our students in the professional visualization and presentation of proposed projects, it soon became one of their basic ideation tools.

Modeling in **form·Z**, as similar as it is to actual fabrication, eases the transitions between the digital and the real. As the student works more within **form·Z**, it becomes a learning tool in the processes of fabrication translating directly to an object's realization in the traditional studio. Five years ago we added computer aided digital fabrication as the next natural step.

This past year our primary fabrication focus was within the course "Objects and the Computer". This class is designed to explore the possibilities and impact of computer modeling on the design and creation of 3D objects and environments.

In conjunction with MCAD's rapid prototypers, the students are challenged to search for form possibilities that might be difficult, or even impossible, utilizing standard studio processes while maintaining a focus on the conceptual issues of the work. This encompasses not only the creation of objects with our Rapid Prototype (RP) equipment but the access to other production processes through "job-shops" enabled by computer design.

HONORABLE MENTION IN FABRICATION

Shanty Town by JESSE GANTENBEIN, Furniture Design
Infiltrated and assembled RP gypsum.

ALSO SEE PAGE #14.

PROCESS

Our training in computer modeling is threefold: Visualization and presentation skills, computer aided design, and computer enhanced creativity with output ranging from patterns through 2D renders to physical output and animation.

Tutorial: The first step is instruction based upon the **form·Z** modeling tutorial to introduce the depth of the interface and the hundreds of tool and modifier combinations. In our semester long courses we work through the entire tutorial which gives the students not only modeling skills but presents the tutorial as a reference to look back upon when they run into a visualization issue that is unfamiliar. In workshops, or intensive short courses, we present a similar process to the tutorial but limited to key techniques and the major modeling tools.

Predetermined Visualization: Our second step is to illustrate objects that already exist or have been sketched out in some detail. This applies the techniques learned in the tutorial instruction while requiring the students to seek out the best tools and process to represent their objects. They soon realize there are probably a half dozen ways to create each element of an object and how their determination of the best approach will effect later steps in the modeling process. Part of this learning process includes many starts, stops, and "redo's".

Exploratory Projects and Ideation: The third step is pure exploration within the software; essentially ideation directly with the computer, utilizing the special capabilities of **form·Z**, to generate un-thought of forms or non-predetermined objects. The students are urged to create works that are too tedious to manufacture by hand, or simply cannot exist outside of the computer or be realized without "building" with a rapid prototyper. This amounts to "messing around" within **form·Z** based upon the understanding acquired in the earlier training steps.

By this time the students are confident enough to act intuitively and "mis-mix" tools just to see what will happen. The ultimate functional test of these explorations is generating a physical object using one of our RP machines. A machine, after all, can only accept proper file formats and "real" objects.

Modern 3D Printers (Additive Rapid Prototype systems) are not much more complicated than a typical flat printer from the user's standpoint. Equipment maintenance can be an issue but even this has been greatly simplified in recent years and similar to a complex copying machine. Subtractive Rapid Prototype machines (SRP; routers and machining centers) require more experienced "setup" and operation including bit selection, material mounting, and cutting parameters simply due to their machining process. Even so many of these machines are approaching the simplicity of a 3D printer.

AWARD OF DISTINCTION IN FABRICATION

Teseneossils by DAN TESENE
Sculpture / Fine Arts Studio
Infiltrated RP gypsum.

ALSO SEE PAGE #14.

This work is about the "building" of complexity; understanding how complex systems come to exist. While algorithmic in nature, Dan develops the objects using a visual and intuitive process in form•Z. He creates an initial modular form that is then multiplied and stacked using form•Z transformation tools. A section of the model is then "deformed" as a group of elements. The groups are then copied, mirrored, transposed, and composed, resulting in the objects that are generated in our 3D Printer.

Most algorithmic artists assume that the works are generated via programming code rather than a direct manipulation by the artist. While this direct manipulation may not be possible without the "invisible" algorithms within form•Z, it demonstrates the artist's use of "computer as tool" rather than primary programming. The artist's focus is on the creation and composition of the object rather than the technical aspects of its generation.

Additive Rapid Prototype Modeling Concerns: Most 3D printers use an .STL (Stereolithography) format file. This format is a list of triangular surfaces that describe the solid model. As a result, all objects must be "closed" or "capped" so as to be solids and "watertight" STL files. This also precludes the use of surface modeling.

It should also be noted that, as STL files triangulate facets, they interpret "smooth objects" as facetted, hence a smooth object will revert to a facet setting based upon its "resolution". As a result, we usually model as "facetted objects" of higher resolution to begin with.

Viewing models in "surface render" will give you a better idea of what they will look like from a RP machine.

Hollow forms: We hollow out all of the more massive areas of our objects to reduce solid volumes that cost us more (our in-house RP "build" cost is based upon weight while job shops generally base cost on time. Elimination of unnecessary bulk reduces both). This is accomplished by "Boolean differencing" smaller copies of the individual elements from their original objects or removing geometric solids. For our machine we try and maintain a 0.125" wall thickness.

Negative molds: Hollowing also enables the students to generate molds directly from our Z-Corp Rapid Prototyper in gypsum. We have successfully cast everything from plastics and low temperature metals to bronze into un-infiltrated molds. The molds are created by differencing the object from a solid block then adding needed sprues, vents, pour cups and lightening holes. We let the mold dry thoroughly then cast using standard practices. (Z-Corp also produces a refractory gypsum material for casting.)

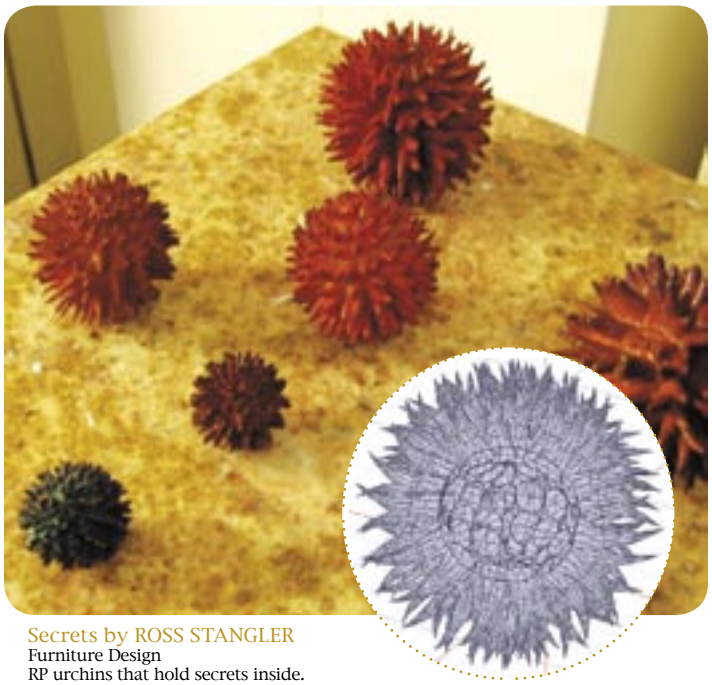
"Testing" the STL "build": We initially use the "Query" tool to check that objects are "facetted", "solid", and "well formed". We then export the models as a STL file and reopen the STL file in **form·Z** to check for lost elements (but do not "re-save" the file to leave the exported file intact). We also check the preview in the STL format "options" dialog but have found that some things visible there are not always visible in the final file.

Modeling for Subtractive Rapid Prototype (SRP): Many SRP machines come with software for translating DXF or other file formats to machine code to create tool paths. Other translation software is readily available and the translation has always seemed effortless and reliable. In house we use software that was packaged with our three axis Modela machine while we generally send DXF files to job shops.

ANDREW JUNG
Fine Arts Studio
A typical RP mold (whose base is its casting).
RP gypsum and plastic.

Structure and Decay by TONY SUNDER
3D Foundations
Painted infiltrated RP gypsum.

Chair by BRANDIS CONROY
Furniture Design
Cast from an RP gypsum mold. Crown pewter.

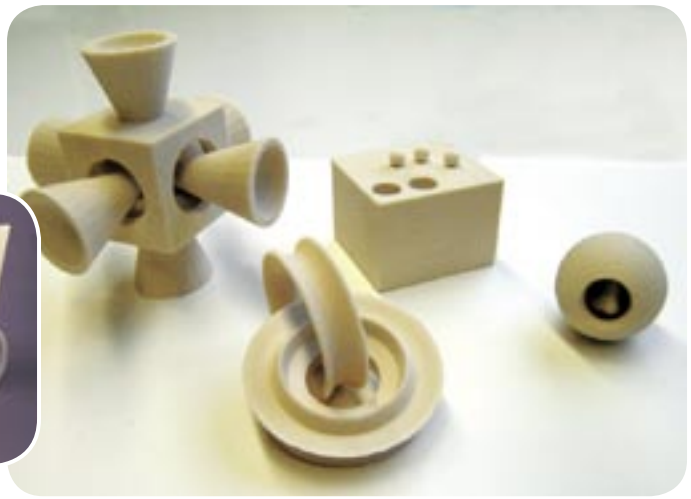


Secrets by ROSS STANGLER
Furniture Design
RP urchins that hold secrets inside.
Surface finished infiltrated RP gypsum.

Cutting file formats: When sending work to job shops for 2D router, laser, plasma, or waterjet cutting, the typical format is a vector line drawing. The shop will be able to tell you their preference as to software. We typically use Adobe Illustrator files, 2D drafting programs, or **form·Z** draft files saved to vector or Illustrator formats.

Digital Patterns: Low cost and machine free! Other fabrication techniques that we find entertaining, simple in **form·Z**, and "machine free" are: "unfolding" of facetted models, generating "sections", and generating "contours". These are then scaled to size and printed on one of our banner printers (or "tiled" in a standard printer) to generate full size sheet metal patterns and traditional "lift" sections for solid objects.

Bench by JESSE GANTENBEIN
Furniture Design
Render and finished full scale from patterns.
Composite fiberglass and wood.



Mystery Objects by JOE LINDEBERG
Furniture Design
Independent but trapped elements inspired by Chinese Mystery or Puzzle Balls.
Infiltrated RP gypsum.

Digital and Analog Strategies for Design Studio

School of Architecture and Design
CALIFORNIA POLYTECHNIC STATE UNIVERSITY
San Luis Obispo, California

BY THOMAS FOWLER, ASSOCIATE PROFESSOR

INTRODUCTION

In a third year design studio, assignments are crafted for students to refine skills in both digital and analog media tools (physical modeling and traditional drawings), to allow them to see the advantages and disadvantages of both, to develop a critical attitude towards media and to develop a design project using these tools. Students start out the quarter participating in a week-long group warm-up diagramming exercise that allows students who are not as familiar with **form·Z** to learn how to use the software in the context of completing a design assignment. Groups are arranged with students who are familiar with **form·Z**, along with students who are not. These groups of no more than four students collaborate and the students who are least experienced with the software are exposed to a fair amount of the software navigation as the student or students who know the software assists in this process.

Students in the process of developing their individual design projects for the quarter use the diagramming and modeling strategies learned from this warm-up exercise. Early individual design exercises are exploratory and students are encouraged to use **form·Z** for its iterative ability and its facility in generating rich graphic vocabularies that are suggestive of spatial character and experience. The use of **form·Z** is balanced with physical model building and traditional drawings to sort out issues of scale and siting. Later exercises such as programming models and 3D vocabulary models, along with sun diagram overlays, require students to translate early vocabularies into working building elements.

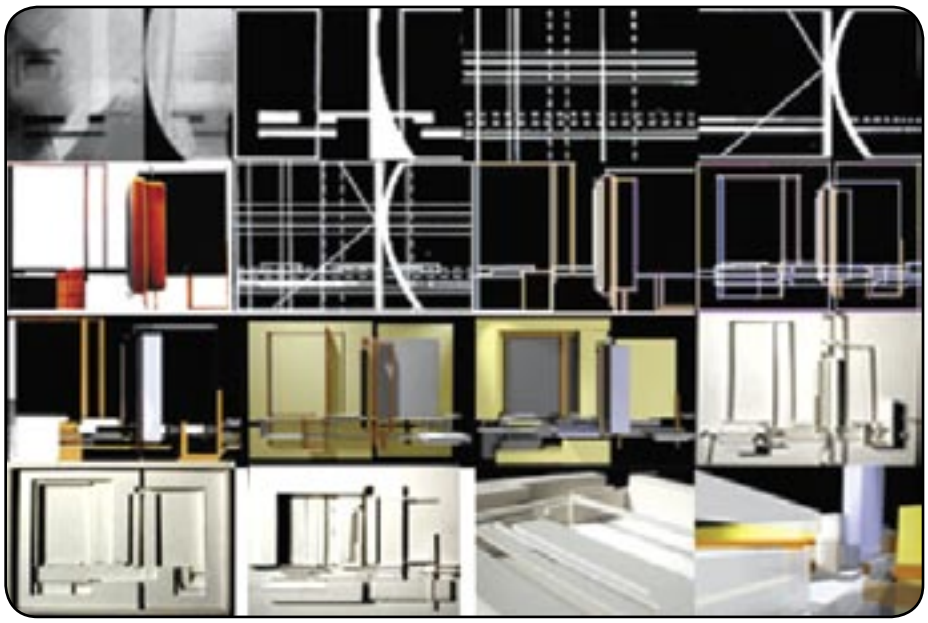


Figure 1: Warm-Up Exercise Summary

GROUP DIAGRAMMING WARM-UP EXERCISE (Figure 1)

This seven-step analog and digital exercise is based on Bauhaus principles of craftsmanship and visual perception. A strict set of guidelines applied foundation principles of the Wassily Kandinsky method of analytical drawing that breaks a still life composition into diagrammatic forces to express tension and geometry. Each step alternated between analog and digital media. This exercise started with still life images, then proceeded to acetate overlays, to analog/digital diagrams, analog/digital relief models and ended with a spatial manipulation device. The outcomes from these group projects provided a foundation strategy for individual student project processes.

EXERCISE 01: Poetic Site Readings (Figures 2,3,4)

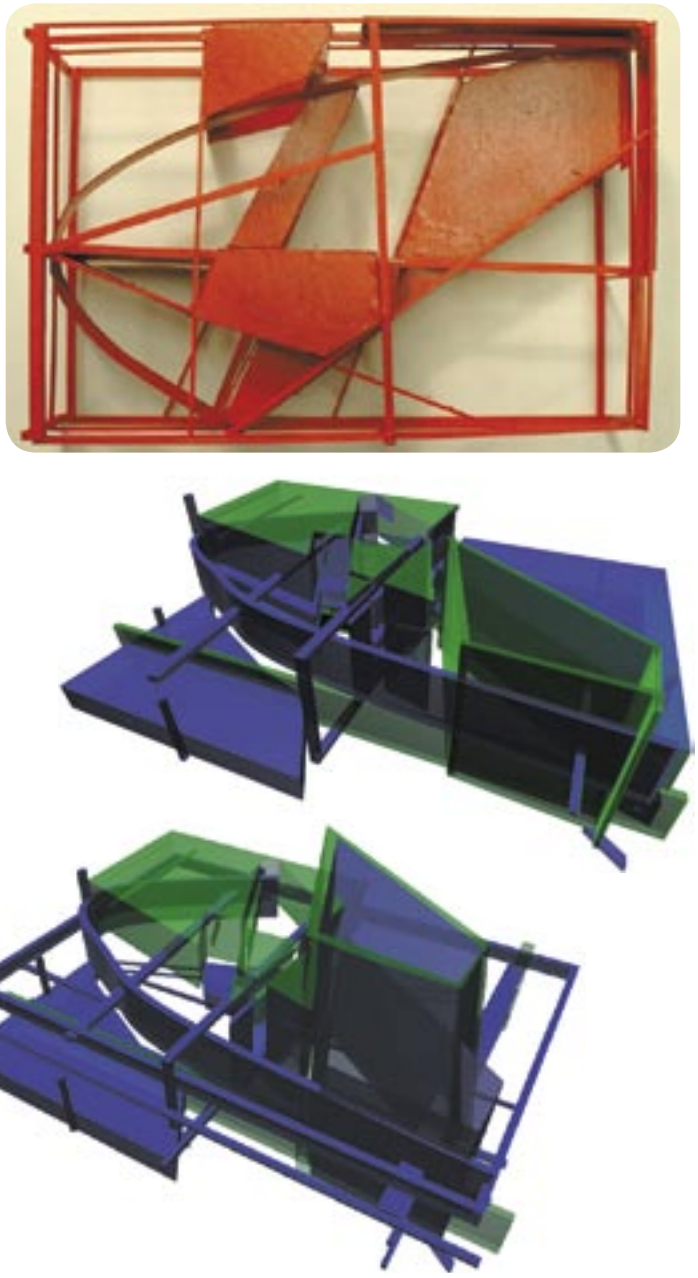
In this exercise, diagram and relief models identify elements from the context that are significant to the student designer.

Figures 2,3,4: Poetic Site Readings

INDIVIDUAL STUDENT PROJECT PROCESS COMPONENTS

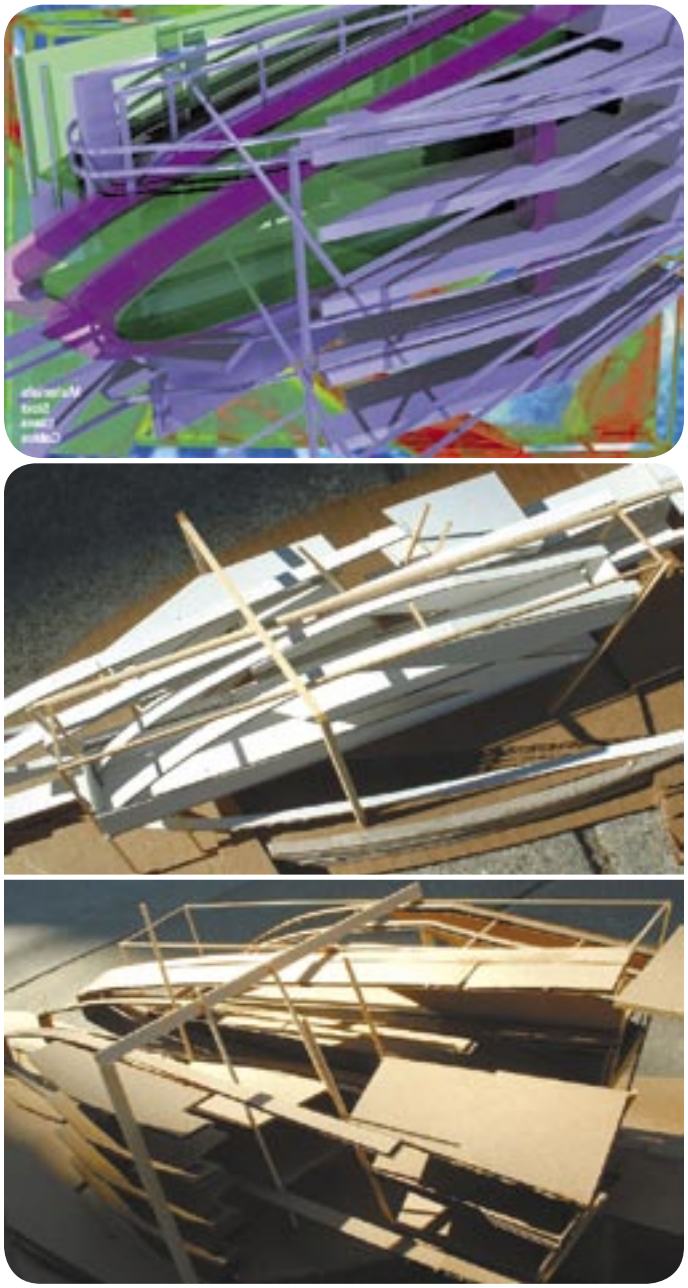
Shown below is a currently in process project (Fall 2005) that shows the analog and digital component pieces for the design project. This is a multi-use project that is sited in New York City. All work is by the third year student Katsunori Shigemi.

EXERCISE 02:
Analog and Digital Relief Studies of Space (Figures 5,6,7)
Site diagrams and relief models provide a strategy for exploring the space sectionally.



Figures 5,6,7: Analog and Digital Relief Studies of Space.

EXERCISE 03:
Analog and Digital 3D Vocabulary Studies (Figures 8,9,10)
Sectional relief model studies provide the strategy for exploring the architectural vocabulary of building project.



Figures 8,9,10: Analog and digital 3D vocabulary studies

CONCLUSION

Going back and forth between **form·Z** and analog media offers the advantage of revealing more quickly and more clearly weaknesses in a project as well as inconsistencies between a student's original intentions and what is revealed in their work. The successful students quickly make connections to the linkages between the digital and analog components of the emerging process of project.

PROGRAM DEVELOPMENT

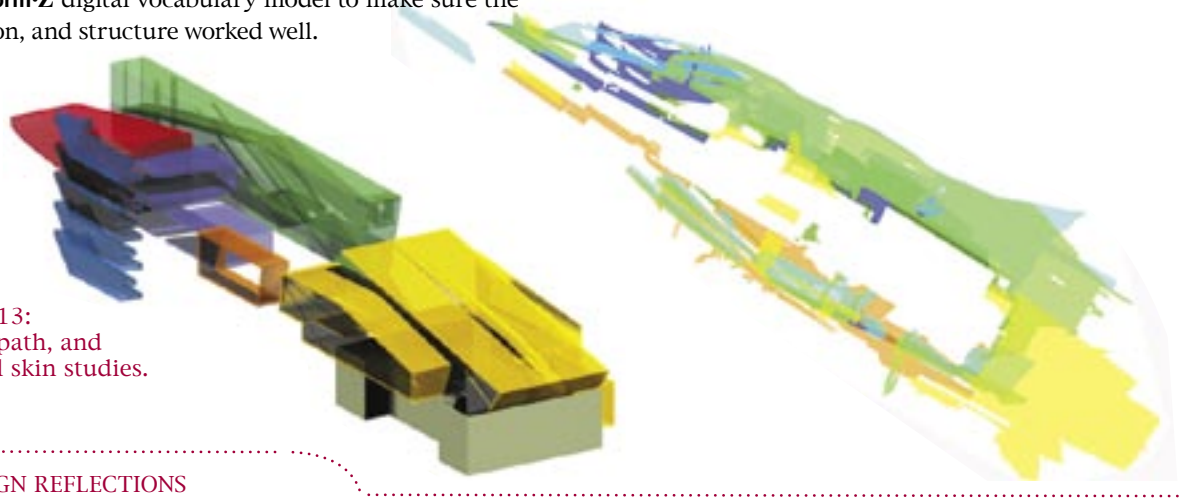
"Amusement Park Voyage" is the concept for my project, which is the Art & Culture center on the south point of Roosevelt Island in New York. This Art & Culture center re-defines the historic island as an amusement park-like structure and is for all ages of people to have physical and visual contacts with art, culture and history through the experiences of the architecture.

I took two different approaches to come up with the design of my project. One was programming, with placing colored 3D volumetric models in **form·Z**, instead of using the traditional bubble diagramming technique. Because of using **form·Z** for 3D programming of spaces, it was easier to understand the relationships among the spaces. Using **form·Z** for program development is particularly helpful when the structure has multi stories, since you are able to study the vertical relationships of space too. I was able to save a time since also it was quite easy to move and replace the lumps on **form·Z**. The other approach I took was analyzing the site with diagrams and physical relief models (figs. 2,3,4). Changing the scale and cropping, I made multiple line drawings and 8-1/2" and 11" relief models. These analog drawings and models were really significant through the entire program development, because what I needed to do after this was to transform the diagrammatic lines and relief models with **form·Z**. Based on the drawings, I used **form·Z** to interpret the lines and study the composition three dimensionally along with considering the spaces between the shapes. I made three different digital relief models as positive, negative, and hybrid, and this hybrid one (fig. 7) became an important base for the next phase, which was making the volumes of space inhabitable. Considering the program, I stretched, rotated, moved, and repeated the digital relief model in **form·Z**, and then I created a digital vocabulary model (fig. 8). After that, I made an analog vocabulary model based on the **form·Z** digital vocabulary model to make sure the scale, circulation, and structure worked well.

PROJECT REFINEMENTS

Besides making the analog vocabulary model, I developed cross and longitudinal section drawings with CAD software and exported as a DFX file for further 3D development in **form·Z**. These drawings showed the qualities of the inside spaces and relationships between the spaces. Also I made some diagrams from the digital vocabulary model by simply turning on and off the layers in **form·Z** to study the circulation, structure, and program. This series of digital documentation helped me to study and develop the project further. In addition, changing the color, transparency, and reflectivity on surface styles of **form·Z**, I started to think about the materials. Studying sun path, I decided upon the location of the glazing and sun shade devices. Quickly checking all elevations of the structure based on sun path study, I was able to develop the vocabulary of the building skins, so they all worked with the specific orientation of the site. Also, **form·Z** allowed me to look inside the spaces so I was able to reflect the outside of the structure inside regarding the interior vocabulary of the spaces.

EXERCISE 04: Program, Sun Path and Developmental Skin Studies (Figures 11,12,13)
Programming, sun path, and skin study models are developed from architectural vocabulary models.



Figures 11,12,13:
Program, Sun path, and developmental skin studies.

PROJECT DESIGN REFLECTIONS

What I learned in the first week warm up group project (fig. 1) was the importance of switching from analog to digital media as a way to understand the advantages and disadvantages of using particular tools to understand my project. The one thing I discovered when I first ventured into the design of my project was that it initially was too much of a physical model driving my design investigation. As a result, what I got was a generic vocabulary, which was simply extruded from my foundation analysis diagrams and relief models. In contrast, when I did develop a digital vocabulary model to work in tandem with the physical one, my project benefited from using the physical model to understand the whole of the project and the digital model to explore the project immersively along with being able to develop the details of the skin of the project. The floating and infinite 3D space in the white or black background makes my mind more open and free than when I work with an analog model. Also, every element does not have to be connected each other in the digital model. This zero gravity world in **form·Z** helps me to soften my designs for the physical world. Moreover, switching analog and digital media back and forth help me to extract the essences of the project. The other thing I learned was the ability of digital media as a tool for design and not just a presentation tool. Experimenting digitally also allows for the possibility of more serendipitous accidents that are useful in the design development stages of a project. In this project, the digital vocabulary models came up even better than what I imagined. There are many more possibilities when you are working digitally to complement the physical model development.

Department of Architecture
MIAMI UNIVERSITY
Oxford, Ohio

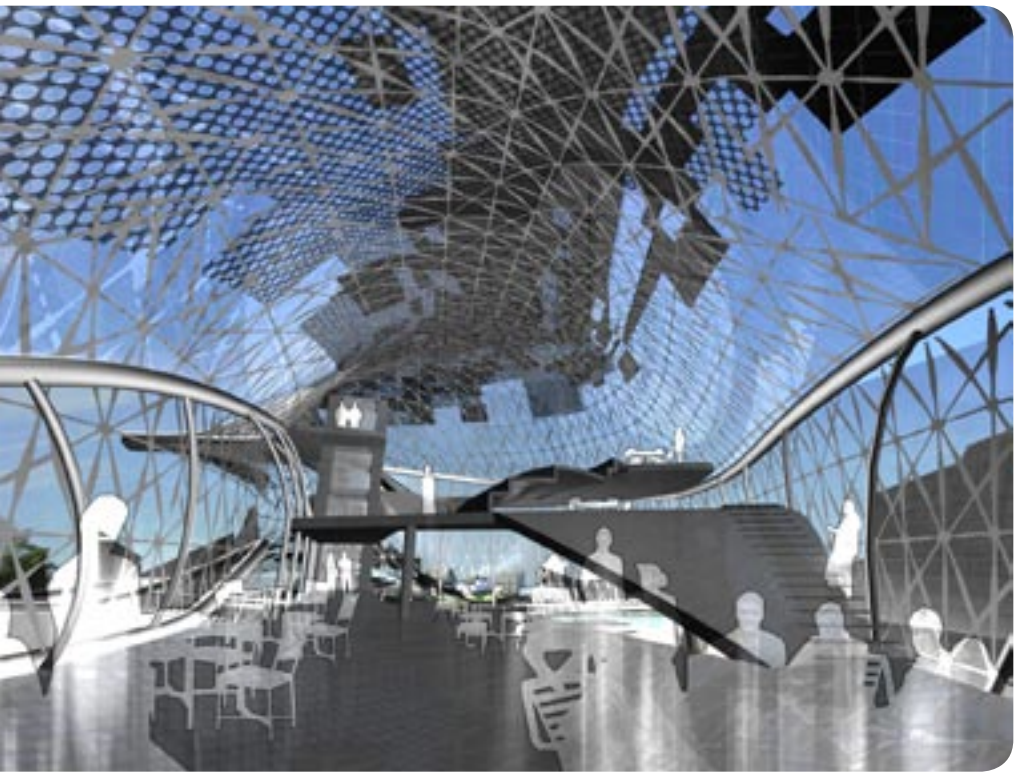
Form Follows ~~Software~~ Concept

Boldly Going Where Computers Can't

AN INTRODUCTION BY MURALI PARANANDI, ASSOCIATE PROFESSOR

Software tools are made to be implements of definable tasks. They are great if used in ways that exploit their strengths while avoiding their weaknesses. But they reveal productive inadequacies when adapted to architectural design processes. Particularly when the logical constructs of the design idea do not parallel that of the underlying algorithms of the computer implementation, production of design alternatives takes significant effort. This lack of fluidity encourages a fixation towards one alternative that is best supported by the tool at hand.

Woodrow Wilson once described Golf as a game in which one endeavors to control a ball with implements ill adapted for the purpose. Just as a golfer changes clubs to suit the game, a designer needs to employ the right tools at the right time in order to develop ideas to fruition. This brings up an important instructional challenge of teaching a digital design studio–to prepare students to compensate for the computer's wimpy (Windows, Icons, Menus, Pointers) nature, as it lacks kinesthetic interaction. This may mean mixing corporal with non-corporal: pencils with pixels, piano wire with NURBS, paper with patches, chipboard with polygons, real with virtual. A careful balancing can take the students on a kaleidoscopic and endoscopic journey that explores phenomena where computer simulation cannot go, forms that defy the limits imposed by materiality, and places yet to be discovered. After all, as Albert Einstein said, the secret to creativity, is knowing how to hide your sources.



Perspective in Restaurant Lower Level looking West

Following is a description of one of such successful journey, embarked upon by a student team (James Diewald, Jon Pietro, and Mike Rudolphsen) in the fall 2004 studio under my direction at Miami University that used **form·Z**'s 3D modeling/rendering/animation capabilities very eloquently during conception, development, and presentation stages of design. At each stage, these students ran into stumbling blocks with **form·Z** tools but effectively negotiated them by shifting media, and while staying on course with the idea, ended up with poetic results that could not have been achieved otherwise. Ideas that started out with plaster models and pencil sketches on paper, reaped the benefits of kinesthetic explorations involving tactile manipulations only possible in the corporeal world. Then these physical entities entered the **form·Z** dimension through a rigorous process of digitizing and building of NURBS surfaces; where the investigation took an endoscopic twist by entering the interiors and inventing the spatial patterns and structural connections via walkthrough animation. Next, the designers prepared a spectacular presentation of the project by using the capabilities of **form·Z** rendering (exporting image information with alpha channels) as a basis for artistic compositing in Illustrator, Photoshop, and various digital video-editing packages. This is a truly successful MULTIMEDIA project that utilized **form·Z**'s capabilities of 3D modeling to extend the capabilities of pencil sketches, plaster/cardboard models, digital drawing, imaging, modeling, and video.

Department of Architecture
MIAMI UNIVERSITY
Oxford, Ohio

Making Viewscape

BY JAMES DIEWALD
DESIGN BY JAMES DIEWALD, JON PIETRO, AND MIKE RUDELPHSEN
INSTRUCTOR: MURALI PARANANDI, ASSOCIATE PROFESSOR

fig. 2 : Massing of Program

AWARD OF DISTINCTION IN ANIMATION

Boathouse at Montrose Harbor

ALSO SEE PAGE #15.

The Metal Construction Association of Chicago holds an annual call for student entries per a specified site and program focused on the use of metal in design. More particularly, metal is to be used innovatively to develop a building envelope as well as a supporting structural framework. This 2004 submission, entitled viewscape, represents a comprehensive investigation of the practical, conceptual, and aesthetic qualities of metal in the design of a multiuse community structure for a site adjacent to Montrose Harbor on the north side of Chicago. The program includes 12,300sf (1150m^2) of conditioned space to be divided between a restaurant, beach house, and convenience store as well as an open-air theater and a viewing platform for the site.

Wind emerged as the unifying element of site forces that included a bird sanctuary, a harbor of predominantly sailing vessels, and the Chicago lakefront. The building form was conceived as an expression of wind through a fluid series of ramps and ribbons, becoming a heart and beacon of site activity. The striking beauty of the man-made landscape encourages interaction between man and nature, staging scenes that are framed and realized through the vertical projection of the restaurant, ramps, and observation space. The building thus becomes a theater of nature, extending vision beyond the programmed stage and cultivating the dynamism of site activity as a panoramic performance.

Beginning with ideas of wind and sustainability the group hit the ground running. Early on we produced several models and performed a good deal of research regarding the application of wind power to the Chicago lakefront. After experiments with a large-scale model in the wind tunnel (fig. 1), we found that active wind power generation on the site would be counterproductive to our conceptual goals. Essentially, to create wind power on the site it would be necessary to implement full size wind turbines that would disrupt the landscape and disturb many of the site elements, including the bird sanctuary. This “blinding success”, as Mike put it, led to the reevaluation of our formal conception of the building.

The new idea was to create a building that was not conceived to capture wind, but rather be an expression of it. Through several group work sessions we soon came to a primitive version of our final design (fig. 2). Jon, Mike and I worked closely together, the product being what we believe to be a true synthesis of ideas. From here, we created another large-scale model from which we defined the essential form of the building (fig. 3). By establishing the form of our building early on through analog process, we were given the time to develop the project to completion in the digital realm and to work out the complexities of modeling organic form.

fig. 1 : First Sketch Model

fig. 3 : Completed Process Model

viewscape.

approach.

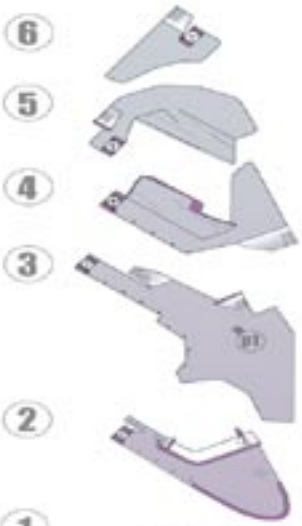
wind as form.

site activity as performance.

program / massing.

the building is composed volumetrically, creating a progressive series layered spaces that move upward, revealing the site.

observation deck 6
casual dining 5
restaurant 4
kitchen
beach house 3
amphitheatre 2
1



circulation.

sun protection.

conditioned space.

by combining conditioned spaces into a single volume, the building becomes a complete unit in summer or winter. the program unnecessarily shifts allowing the bait shop / convenience store to become gallery and retail space during winter months, creating a larger overpass.

skin respiration.

the placement of louvered vents (green), allow the skin to breathe by creating a thermal chimney that uses the forces of rising air and wind to sustainably regulate temperature in summer and winter conditions.

Using a Microscribe probe digitizer, we digitized the model seen in figure 3, which we found to be surprisingly (and conveniently) to a nearly exact scale. Having only introductory experiences with NURBS based modeling; the team struggled with how it might be possible to construct this building. Several cups of coffee and 20 **form·Z** models later, we had a smooth skin. Derived from contours taken from the physical model, our new skin had been created, broken apart, and reassembled in an experiment none of us hope to repeat.

This exploration of NURBS and other forms of smooth modeling again presented themselves when we decided to rework the floor plates. To extend our concept of wind and fluid motion, and strengthen the design, we added in the sweeping motions along the interior circulation patterns (fig. 4). Also, we created a morphic ramp that created informal seating and dining spaces and allowed for the continuation of the "theater of nature" (fig. 5). This ramp, like the building skin, required a number of steps to resolve and proved to be incredibly frustrating. Once again, the results of the accomplished whole were a great addition to the design, and a good deal of learning in the areas of Boolean operations as well as T and Q-subz.

fig. 4 : Early Model of Interior

The innovative use of image and transparency mapping allowed us to establish the materiality of the building without the necessity of physically modeling certain complex components (such as the space frame seen in the interior perspectives). By utilizing constrained quadratic subdivisions and ruled surfaces, a developable geometry was generated, allowing for the design of a differentiated skin comprised of layers of glass, perforated metal, and light gauge sheet metal. By systematically defining panel locations in relationship to solar conditions on the site, a shading gradient was formulated utilizing these materials. This offered the opportunity to limit solar gain while generating a distinct aesthetic driven by environmental as well as programmatic requirements. For instance, the main generator of envelope opacity or transparency accommodates views out onto the site.

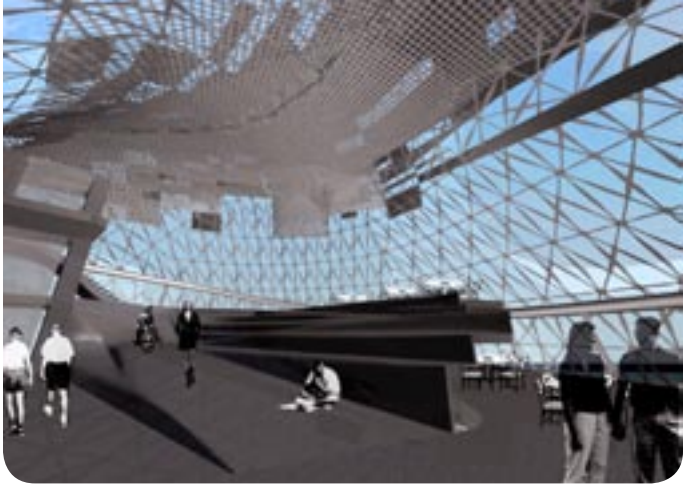
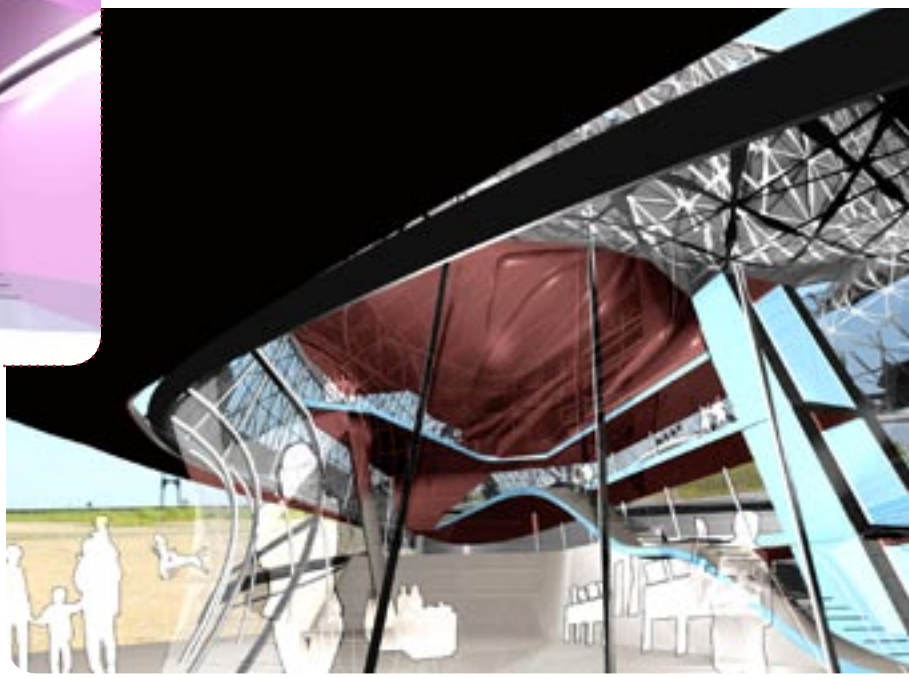


fig. 5 : Montage of Ramp Surface

Given all the pieces, we were confronted with the difficult task of legibly visualizing a building with such irregular geometry. While conventional plans and sections proved to be valuable supplements and were created for print, animation became critical in providing individuals a means of understanding the project. The use of still montage imagery negotiated by walkthrough clips became a framework that, when supplemented by program call-outs and a systematic, multi-scalar analysis of the supporting structure, told the story of viewscape. Wireframe, QuickDraw, and **RenderZone** animation clips also offered a unique way of depicting certain qualities of the design.



Perspective From the Beach House Looking East up to Restaurant

For us, the idea informed the use of a variety of tools and processes rather than the idea being a result of available tools. Put differently, viewscape was not a design created in response to the abilities and functions of **form·Z**, but rather an idea facilitated and developed through varied, and often improvised methods that exposed both strengths and weaknesses in the software.

School of Architecture
CLEMSON ARCHITECTURAL CENTER
Charleston, South Carolina

The Gibbes Installation

a digital, manual, and perceptual production

BY ROBERT MILLER, PROFESSOR
AND JOSHUA ALLISON, LECTURER

In 2003 the Gibbes Museum of Art invited the Clemson Architecture Center in Charleston (CAC) to design and construct a temporary installation in front of its historic Beaux-Arts façade. We were asked to do three things:

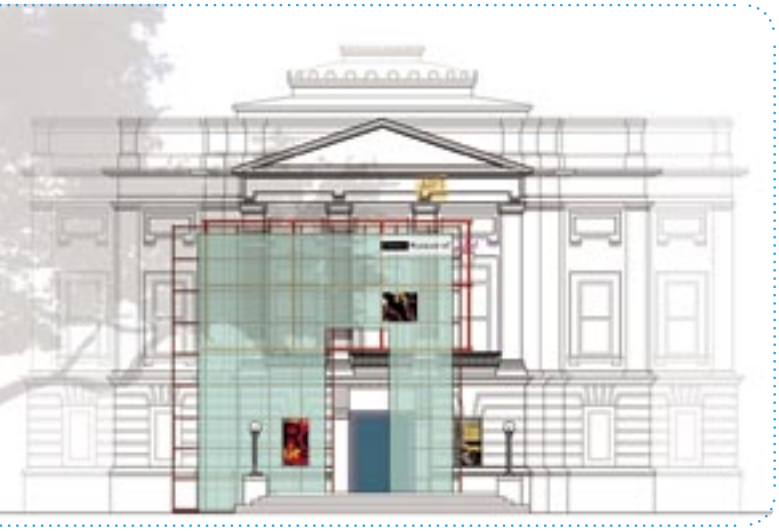
PERCEPTION: To call attention to the building, putting it on the cognitive map of Charleston for both visitors and tourists.

CONCEPTION: To alter the public conception of the institution, updating people's image of the Museum.

RECEPTION: To transform the entry sequence, getting people to come inside (once they find the building).

CONCEPT

Restricted to a temporary installation of two-years duration, we proposed to accomplish this mission with some irony: by covering up the most valued and only visible part of the façade. By installing a screen over the building's temple front, and using that screen as a canvas, we could bring the Museum's activities out to the street and stimulate a healthy debate about the nature of the institution as well as the building's virtues–and problems.



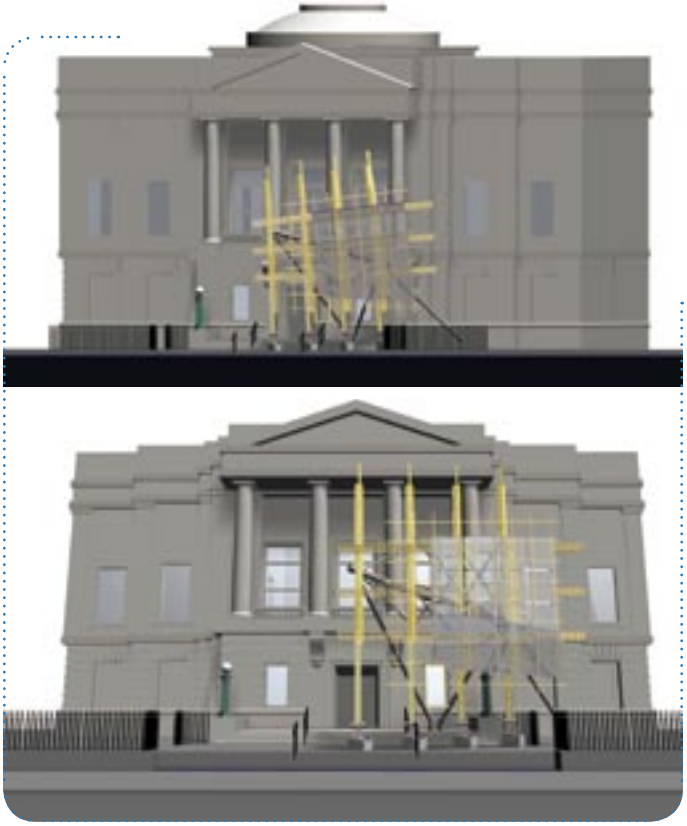
DESIGN DEVELOPMENT

A careful analysis of Frank Milburn's original design of 1903 revealed a sophisticated composition that employed subtle compositional and perspective devices. The layering of the building is especially effective at creating an illusion of center projection, a visual ploy that is now diminished by vegetation planted around the building. The original design moves have been catalogued and redeployed in the Installation in such a way as to enhance, yet transform, the Beaux-Arts principles.

In critique of the emerging design, however, we discovered a severe limitation in hanging a screen across the façade: it was restricted to two-dimensional effects, these being effective only upon entry. By pulling the screen off the building, a new spatial capacity was made possible between building and Installation that also transformed the movement sequence both into and out of the Museum.

With the Installation pulled away from the building, it had now to be re-designed in perspective, and perspective, we had already learned, was a critical feature in the original design. Setting up a centered axial approach, the carefully composed layering of the Gibbes exploded the temple-front toward the viewer: the closer one gets, the more dramatic the apparent projection of the center of the building. This phenomenon, not evident in elevation, is only activated in perspective.

To incorporate but transform the working of perspective as a fundamental aspect of the Installation, we reversed its role vis-à-vis Milburn's design. While the Gibbes is essentially flat and orthogonal, the Installation is skewed and topsy-turvy; standing on axis, however—just where the Gibbes façade is activated in perspective—the Installation visually flattens out and aligns with the building behind. Thus, the Installation calls attention to the role of perspective in the original design, but employs it in an obverse way.



DIGITAL MODELING

As a consequence of its perspective role, the Installation could contain no right angles—not in any of its three axes. Because this was a design/build project, we initially planned to deal with this complexity by making every connection field adjustable. When this proved to be both technically complicated and beyond our budget, we turned to **form·Z**. If we could not build a large and exacting structure by adjusting its visual alignments on site, then we would have to rely on a digital model.

Because the Installation was to be tuned to an existing building, we first needed extremely accurate three-dimensional of the existing setting. This was obtained (complements of Thomas & Hutton Engineering Co.) with a high-definition scanner. Essentially a laser that scans the built environment, the device correlates readings from two or more positions to arrive at a three-dimensional read-out of both horizontal and vertical elements within its field of view. (The readings in our case were accurate to within 1/8"). DXF data from the scan was imported into AutoCAD from which a raster drawing was made and exported to **form·Z**. (The millions of points recorded by the scanner exceeded the capacity of **form·Z**'s Re-Engineer plug-in, which we used later for smaller detail additions.)

To verify that **form·Z**'s perspective algorithm would approximate site conditions—one would not want to construct a perspective-sensitive design that worked digitally, but not in real life—we took field measurements of a pole-relative-to-the-museum, and compared these to a digital simulacrum. We believe **form·Z**'s digital environment will adequately replicate the actual viewing conditions.

FABRICATION

Prefabricated entirely by students, the Installation is in its third semester of construction. Made primarily of wood, it also includes carved limestone, steel, and lexan sheets.

Perhaps the most interesting component of the project, relative to the Installation's perspective design, is a three-dimensionally skewed grid of approximately 28' X 28' X 6". Using dimensions and angles generated in **form·Z**, a pattern was laid out upon a custom deck; then, vertical templates (each at different angles) were affixed to the pattern. This great formwork then allowed the grid, skewed in three dimensions, to be built up from eleven layers of ½" plywood, each attached and encased in epoxy.

Other components of the work were similarly informed by **form·Z**. The dimensions and placement of four structural piers, of identical proportion but of unique size, were developed in the software. Patterns were then plotted at full scale and used in fabrication.

Lastly, steel components developed in **form·Z** were exported to AutoCAD, whose files were sent to a steel fabricator's C&C laser cutter.

SUMMARY

The project is scheduled for on-site installation in January 2007. All of the engineering and the majority of the materials have come from donations in the architectural and construction community around Charleston. It is our hope that the project will bring attention to a great institution and appreciation of a remarkable Beaux-Arts building.

Department of Architecture
TEXAS TECH UNIVERSITY
Lubbock, Texas

Analog-Digital Light Box Exercise

BY BENNETT NEIMAN, ASSOCIATE PROFESSOR

"...we have presented a studio course, or if you prefer, a laboratory or workshop course which opposes an administrative attitude of 'theory and practice.' Naturally practice is not preceded but followed by theory. Such study promotes a more lasting teaching and learning through experience. Its aim is development of creativeness realized in discovery and invention–the criteria of creativity, or flexibility, being imagination and fantasy. Altogether it promotes 'thinking in situations,' ... it is time to advocate again a basic step-by-step learning which promotes recognition of insight coming from experience, and evaluation resulting from comparison. This, in sum, means recognition of development and improvement, that is, of growth, growth of ability. This growth is not only a most exciting experience; it is inspiring and thus the strongest incentive for intensified action, for continued investigation (search instead of re-search), for learning through conscious practice."

- Josef Albers. *from Interaction of Color*

Today's architecture student must fluidly demonstrate design interchangeably with both physical material and new media. The Analog-Digital Light Box exercise sets up a rigorous series of incremental and additive exercises, but at the same time introduces an attitude of open experimentation. The course is not a disconnected technical computer training course, but a seamless exchange of information between various design applications, creating an inviting environment in the context of contemporary media. The exercise stimulates action followed by reflection, or as Albers suggests, a non-administrative approach to practice followed by theory.

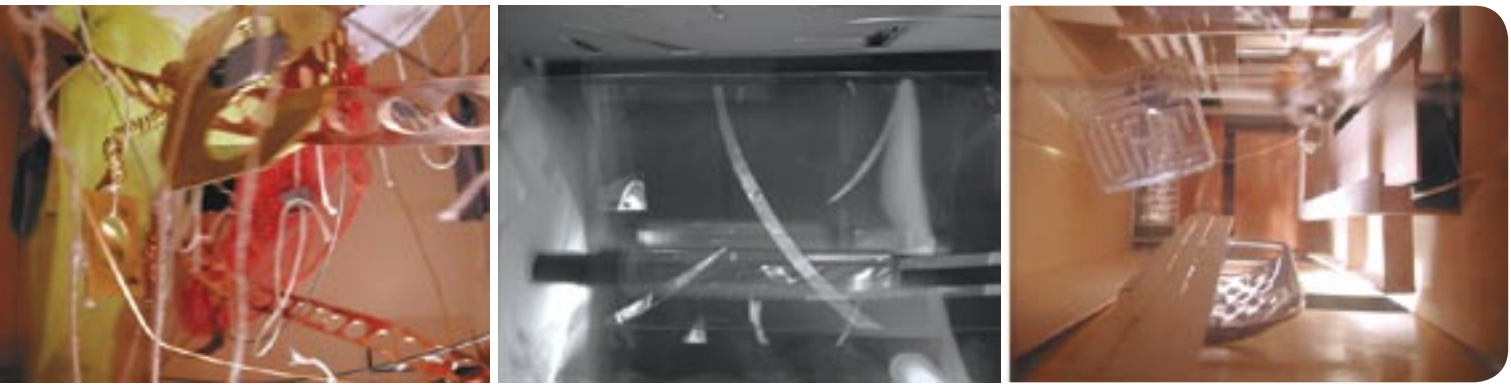


Fig. 01. Analog light boxes: KEVIN MERKLING, JEFF OLGIN, ERIC MITCHELL.

The Analog-Digital Light Box relies on timeless ideas drawn from Lazlo Moholy-Nagy's book, *Vision in Motion*, where he discusses camera-less photography, space modulators, motion cubes, light boxes, and the eight varieties of photographic vision (abstract, exact, rapid, slow, intensified, penetrative, simultaneous, and distorted seeing). The design methodology emphasizes experiential and sensorial perception enabling the study of form, space, material, light, shadow, color, transparency, translucency, texture, and motion.

Traditional media is combined with new media. Current trends are referenced from *The Language of New Media* by Lev Manovich where he proposes a five-point definition of New Media: (1) new media objects can be numerically represented; (2) digitized objects can be dynamically automated; (3) new media objects are modular parts that can be rearranged; (4) variability means that the parts may be used or displayed in a variety of ways; (5) and transcoding allows the objects to be transformed and manipulated, creating entirely new kinds of products. All of these points are demonstrated in the course.

This method has many potential beginnings. It can start with drawing, photography, or physical modeling, with or without specific formats or procedures. The starting points are varied over the years so that it does not become a static or predictable formula. The seeming mystery of the overall approach is a part of the game of discovery. As the technologies of new media evolve, other trajectories and combinations are possible. As each new group of students engages the exercises, new ideas are applied to the pedagogy for future groups. Thus, the exercise is an evolving dynamic process.

The Analog-Digital Light Box returns to the basics by requiring tactile studies in different media. After a physical media is introduced, then a tactile digital one is worthy of study, followed by physical form studies. The ability to fluidly move ideas through control, experimentation, and interaction is a key milestone. While students must be brought through a range of media very quickly, the goal is unchanged: teach them to appreciate the nature of each medium they approach, so they can apply that appreciation in future design.

Fig. 02. Analog light box digital performances: C.J. MACQUARRIE.

Fig. 03. Digital reconstruction and analog diagrams: C.J. MACQUARRIE.

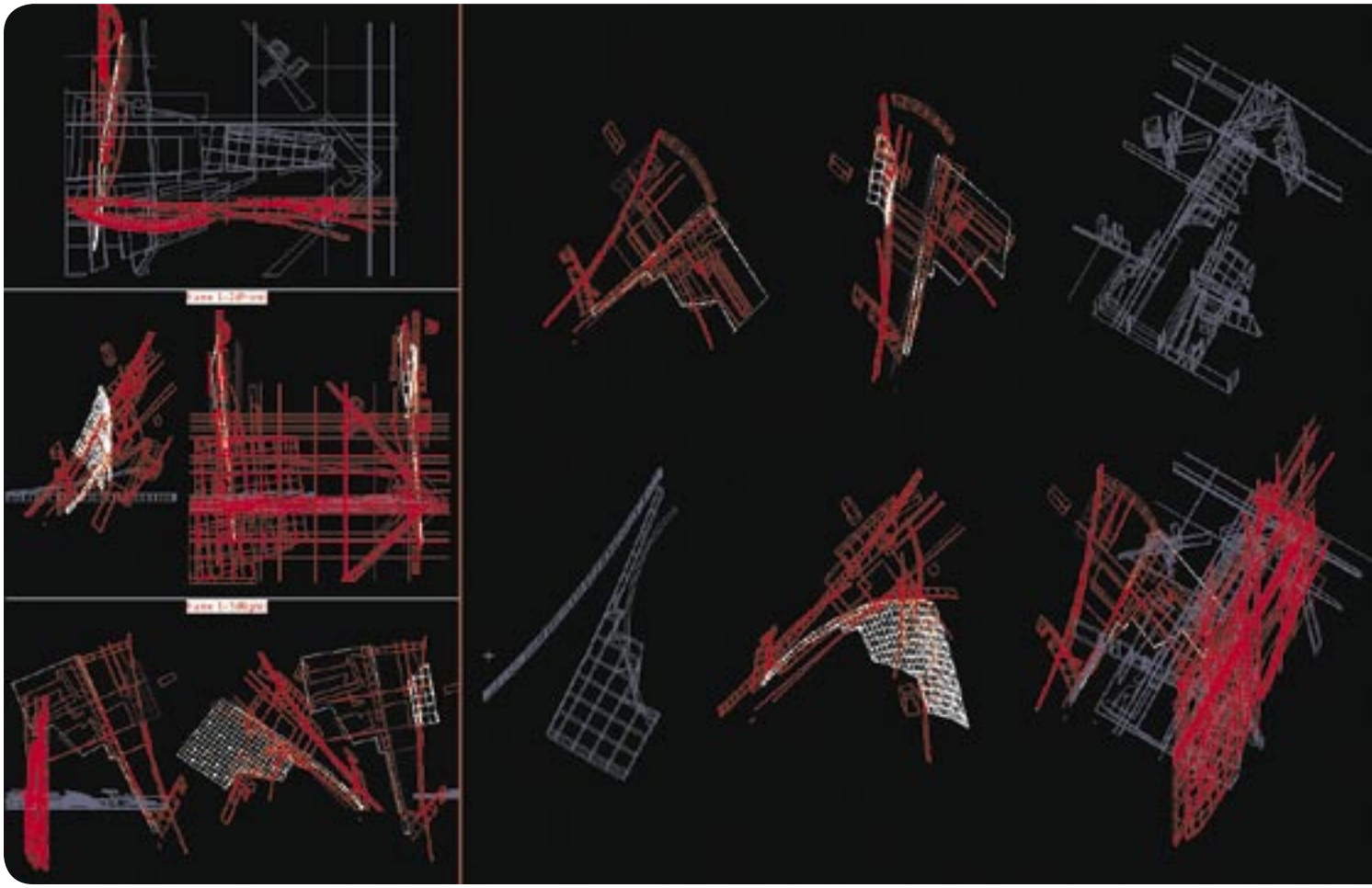


Fig. 05. Digital reliefs and the configuration into a digital light box: MICHAEL MAGEE.

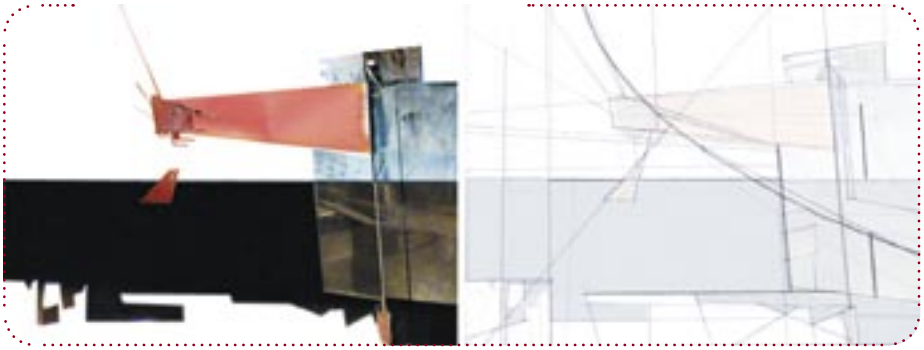


Fig. 04. Digital reconstruction and analog diagram: OMAR GARCIA.

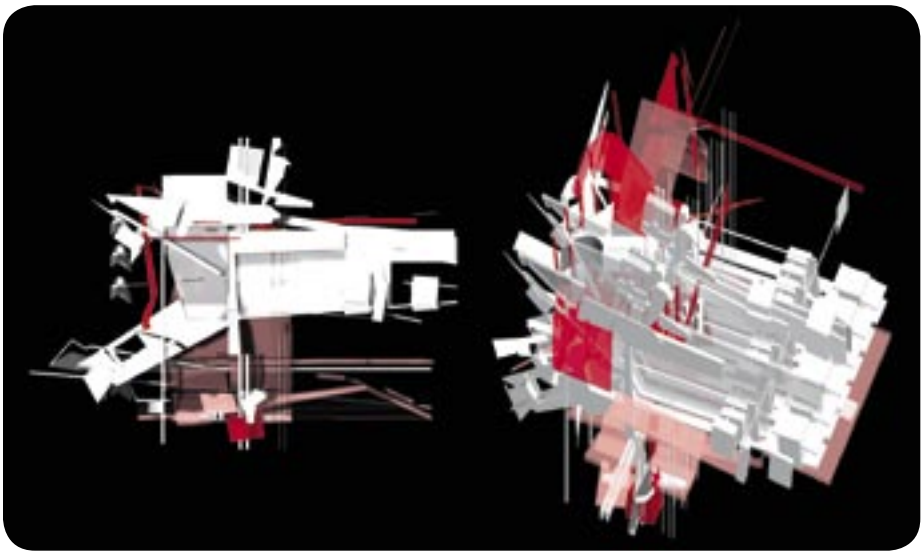


Fig. 07. Digital relief and digital light box: C.J. MACQUARRIE.

Working with the hands must remain. But according to new media principles, they must be constantly digitizing, and re-factoring their process with the aid of tools that extend and complete the vision of their work. Moholy-Nagy's precise definitions form a solid foundation that is not only easy to apply, but ideal for a database driven world. In short, these are the potential "parameters" for modulating and controlling the study and feedback between viewers/users of all aspects of design work.

The work shown is from an undergraduate architectural studies seminar taught during fall semester 2004. Earlier graduate level versions of this type of exercise received the *AIA Education Honors Award* in 1994 and 1998. The pedagogy is offered not as the solution, but as a renewed model for basic design, satisfying the demands of students representing a paradigm shift, while acknowledging that architectural education is best served as an open and exploratory liberal art.

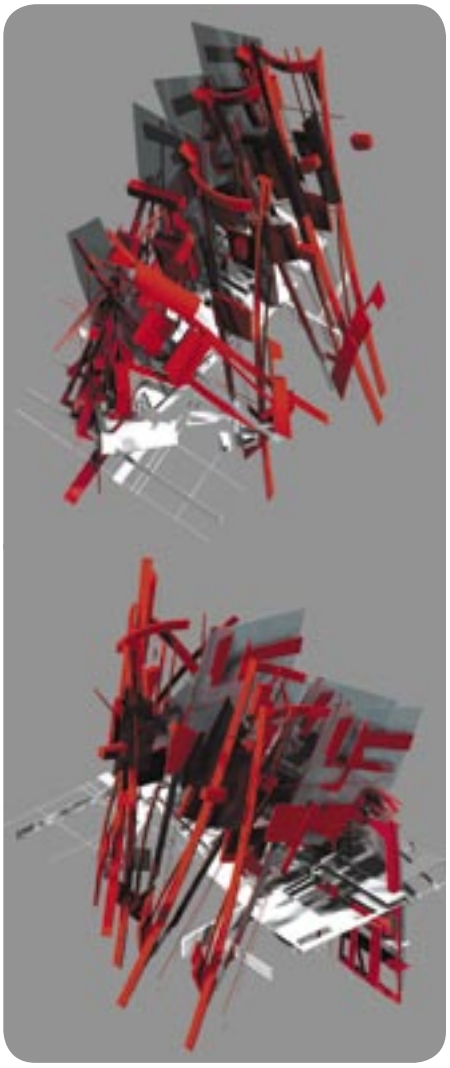


Fig. 06. Digital light box: MICHAEL MAGEE.

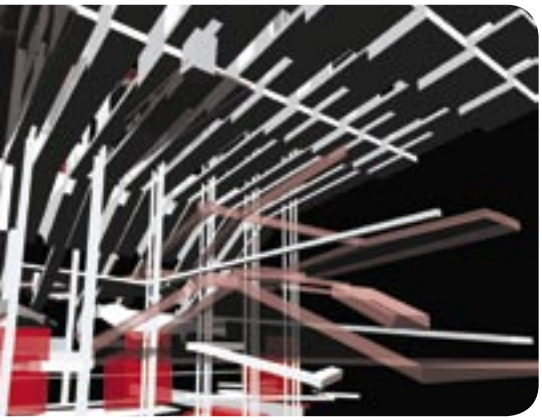


Fig. 08. Rapid seeing: C.J. MACQUARRIE.

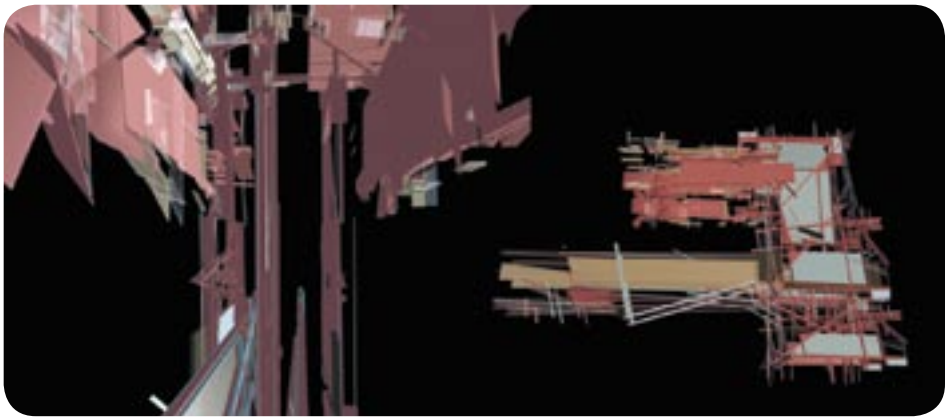


Fig. 09. Simultaneous seeing: OMAR GARCIA.

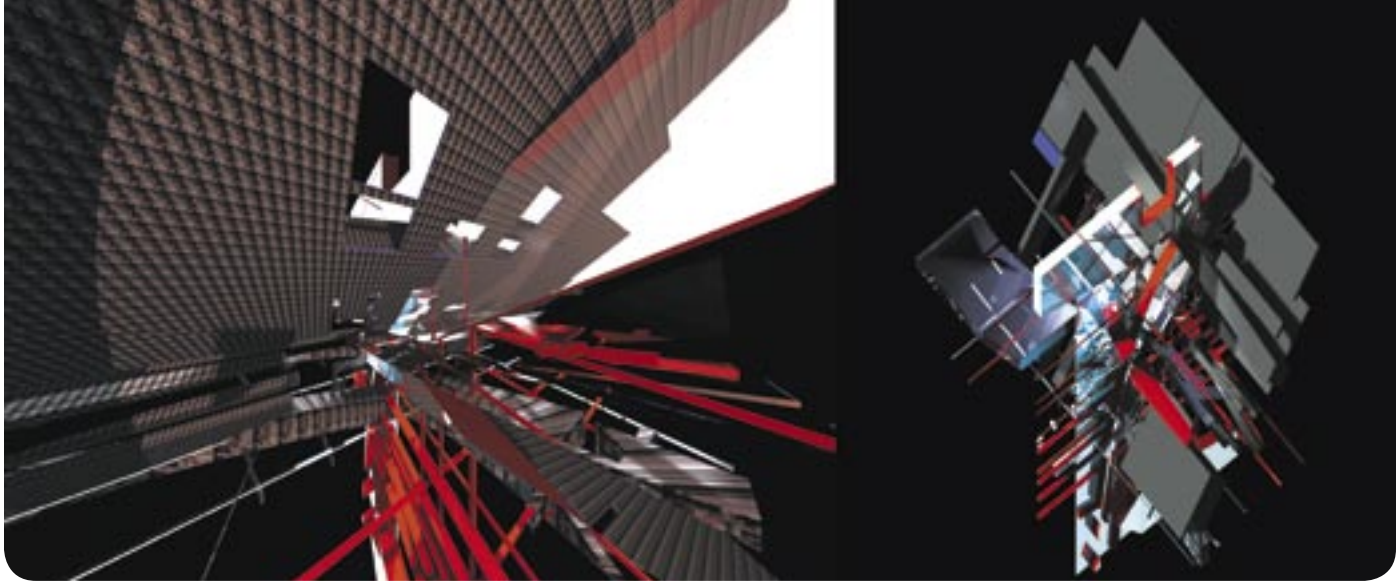


Fig. 11. Distorted seeing: GABE SALAZAR.

THE ANALOG-DIGITAL LIGHT BOX EXERCISE

"The space modulator provides the opportunity to relate design to direct work with materials as against previous architectural methods in which structural inventions were hampered by the shortcomings of visualization on paper alone. On the other hand, structural projects could be solved just as well by working with the model alone; but again this would not give the experience in visualization and development on paper which is essential to the exploitation of a 'space fantasy', one of the main requirements of contemporary architecture."

– Laszlo Moholy-Nagy

The process unfolds as a series of exercises, each with its own set of interrelated experiments, media, and time frames. Teams design and construct an analog light box, according to ideas described in Moholy-Nagy's Vision in Motion. Students are encouraged to think of interesting material combinations and ways of creating movement and interchangeability. They begin the process in the "real physical material world" of three dimensions. Each student harvests a unique vocabulary by isolating, cropping, selecting, and cataloguing a variety of significant fragments, shapes, textures, and colors from digital captures of the analog light box. Working rapidly with new media objects, a series of architectonic reconstructions are fabricated, emphasizing connections and jointure. Numerous sketch diagrams study the hidden geometries of the transcoded image according to several analytic categories such as: orthogonal grid, tension, schema, and interpretive tracing. Students translate these analog diagrams into a vector format. Through the use of **form·Z**'s Boolean operations, the formal possibilities of layer combinations are expanded as digital templates.

Using **form·Z**, digital reliefs are projected from the two-dimensional templates into a beginning three-dimensional study. Students work with solids and voids, and deformations of positive and negative space. Several digital light boxes are visualized by freely re-arranging and experimenting with combinations of elements from the digital reliefs. They discover and record multiple isometrics of the construction and immersive perspective views. They work with color derived from the digital reconstruction source, and experiment with potential transparency, opacity, and translucency. Students produce sectional sequence animations in order to understand the relationship between the form and space of a constructed spatial fantasy.

References:

Albers, Josef (1963) Interaction of Color. New Haven, CT: Yale University Press. p 69.

Manovich, Lev. (2001).The Language of New Media Cambridge, MA: MIT press.

Moholy-Nagy, L. (1969) Vision in Motion. 8th edition. Paul Theobald and Company.

Negroponte, Nicholas. (1995) Being Digital. New York: Alfred A. Knopf.

Neiman, B. and J. Bermudez (1997). "Between Digital and Analog Civilizations: The Spatial Manipulation Media Workshop," P.Jordan, B.Mehnert & A. Harfmann (eds.): Proceedings of ACADIA 97: Representation and Design, Cincinnati, OH.

Neiman, B. and E. Yi-Luen Do (1999). "Digital Media and the Language of Vision," O.Ataman & J.Bermudez (eds.): Proceedings of ACADIA 99: Media and Design Process, Salt Lake City, UT.

Nicholson, Ben. (1990) Appliance House. The Chicago Institute for Architecture and Urbanism.

Poling, C. V. (1986). Kandinsky's Teaching at the Bauhaus. New York, Rizzoli.

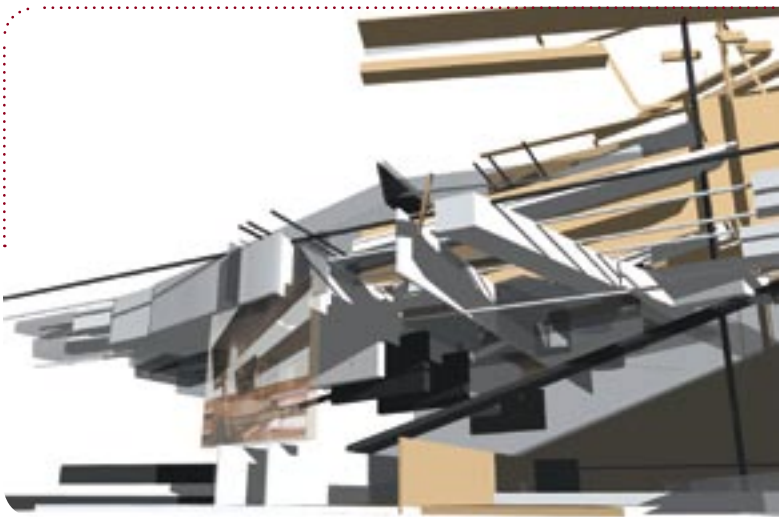


Fig. 10. Abstract seeing: Eric Mitchell.

Digital/Analogue Methodologies: Integration and Abstraction

School of Architecture
UNIVERSITY OF TEXAS AT ARLINGTON
Arlington, Texas

BY THOMAS RUSHER, ADJUNCT PROFESSOR

There are two classes of several that I instructed at the University of Texas at Arlington's (UTA) School of Architecture where I employed a strategy of Digital Methodology development to design process-based Spatial Constructs. Each class was approached differently, considering the students' level of exposure to design principles. These were an Advanced Computer Applications Class, which was an upper division course taken by both graduate and upper level undergraduate architecture students, and a sophomore architectural design studio. The upper division class was conducted during a short compressed and intensive mid-semester term between long sessions. One of the premises of the class was to question the notion of a skills based, (software training), class in the context of upper division architectural design students. Was it appropriate to simply teach the tools at this level to be applied at a later date in another design environment, or should the learning of the tools become integral to the application in design? There was no question for me that at this level, advanced computer application meant the "advanced application of computing" as opposed to the advanced tooling of application functions. The sophomore architectural design studio is an environment where skill acquisition and design concepts work hand in hand. This was the ideal environment to introduce theoretical applications of technology and demonstrate its relevance to basic design principles. By this point, most students have had some degree of software exposure in the secondary and elementary school system with no real theoretical conception of the potential as a generative design tool. In the setting of a fundamental design class, the importance of understanding emergent technologies as a design instrument, developing both digital and analogue spatial design methods, and learning the strengths and weaknesses of the two was of paramount concern. Should students learn traditional methods of design by hand first? Is there a linear mode of teaching design from traditional hand generated methods to digital methods? Not really, in an age where technology dominates the design professions, the integration of digital methods with traditional ones becomes even more critical to introduce at early stages in architectural design. This entails an intimate familiarity with the technology on the part of the instructor in addition to design knowledge. The alternative is a linear mode of step by step instruction, sketching, drawing, and digital. The future really lies with those that understand the value of each and can truly integrate them in a non-linear fashion. In both classes, an experimental attitude towards evolving technologies was considered taking into account the differing levels of design knowledge.

JACOB WAHLER

MARIA FERNANDEZ

The separation of digital skill attainment and the broader issues of "application" as a design instrument cause a schism in the minds of students attempting to understand the value of the device. Learning how to construct objects and render them in

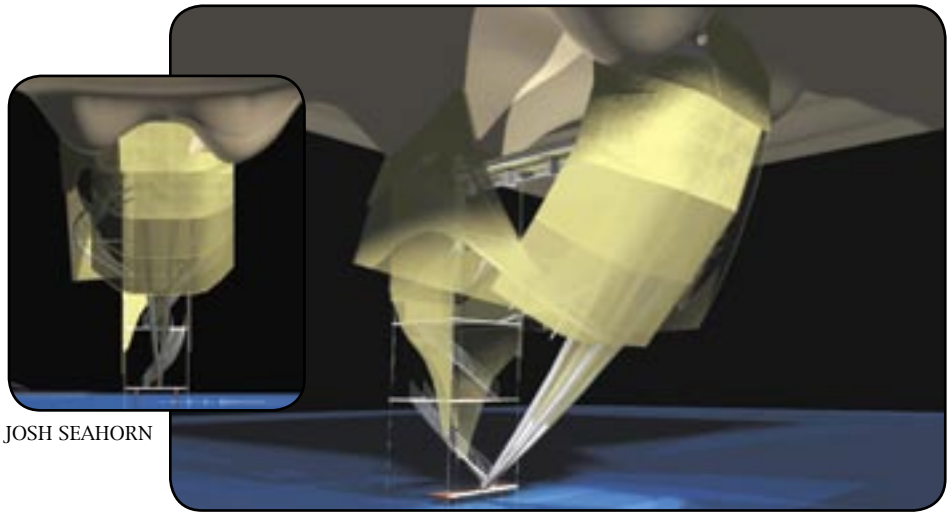
JOSE BALBOA

a design deficient environment begins to establish a separation of the device from its true potential as a design apparatus. The strategy of creating photo-realistic graphics of recognizable and familiar pre-conceived "realistic" environments leaves a large gap for the exploratory nature of digital design. Interestingly, a common link between many of the **form·Z** Joint Study Principal Investigators seems to be leveraging the abstract and experimental nature of the software. Arguably, it is the software's sensibility towards the generation of abstract elements and usability that aids in the discovery process. The integration of design and skill attainment is an essential part of closing the gap between accepting what a program does verses rapid synthesis of program functions and creative manipulation of software to achieve design objectives.

The abandonment of the abstract nature of 3D modeling software misses the potential of the tool as being a new environment that can inform our perceptions and preconceptions of design. Computing and architectural design have moved exponentially away from simply a graphic representational and/or documentation tool. It has become a laboratory where serious conscientious design explorations can be conducted and physically manifested through rapid prototyping techniques. The sophistication of certain software has afforded architects and academics the ability to develop new approaches and methods for conceiving of architectural designs. The evolution of the computer as a generative, analytical, experimental, and conceptual design device has called into question the methods of pre-information age architectural design. This has caused a rift between those who understand and embrace this technology and those that still remain unaware or unconvinced of its design value. There is no question that there are strengths to freehand sketching and it is a skill that needs to be continued in the architectural education process. On the other hand, the postponement of basic digital design at early stages of a design education is an error equally as grave as postponing sketching till a later date. This is a linear segregated mode of thinking. An integrated strategy incorporates basic concepts from both digital and analogue methods and blurs the distinction between the two. The notion that computer design is simply a skill that should and could be quickly acquired to then be leveraged at a later date is what causes disconnect between the potential of the device and the superficial development of graphic technique. Having stated this, some architectural digital classes at the university level are still run as simply software training classes, with no connections to design processes or the theoretical nature of different program types. The true integration of technology and traditional design techniques to leverage the strengths of each should be an integrated and not segregated process.

Distinguishing between a well rendered image and a well conceived design might be part of the confusion. Being able to distinguish between an unexpected turn of events, or a discovery, and thoughtless digital noise becomes a necessary ability for educators to develop. This can only be achieved through experience and familiarity

with the technology, developing a comfort level with the rapid pace of change, and keeping up with new developments. The ethics of design, or rather intent, also has a hand in thoughtful, intellectual investigations. The "happening" still has relevance in the digital realm. It's when the entire project becomes a "mishap-pening" that issues arise. In design schools, distinguishing between the two is easily done irrespective of the way a design is generated. Good design is just that, and being able to guide a student through the abstract world of computing, grasp the nature of the tool, and discover its relevance in contributing to a design process becomes the responsibility of a well informed and technically proficient design instructor. The era of the technology person training students and technically deficient design instructors is rapidly coming to a close. The separation of a digital and traditional design professional's methods is a thing of the past. A seamless, integrated hybridizing of digital and traditional design skills is the future of architectural design schools and those that are technically deficient will be relegated to working within the confines of pre-information age methods.



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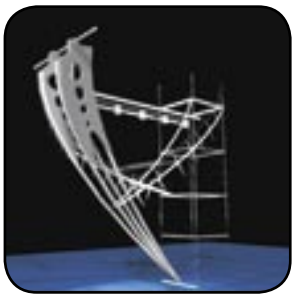
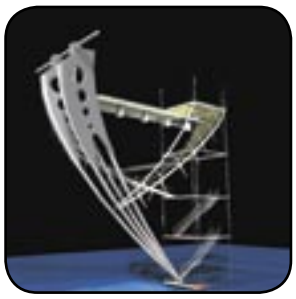
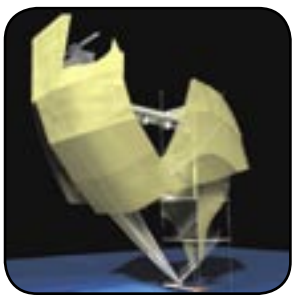




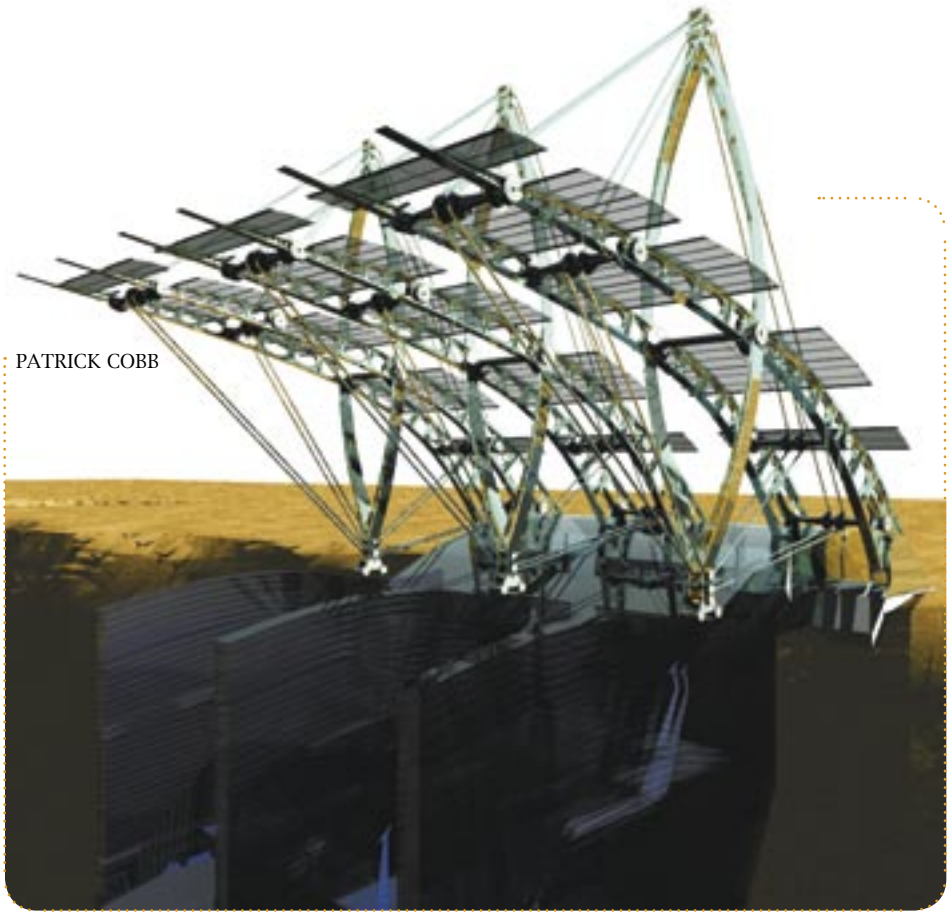


Is there software that lends itself to rapid acquisition, sophisticated components for researching broad architectural design topics and, like sketching, provides an environment for cognitive reasoning and spatial perception skills development? Of course there is, there is a bounty of programs available. There are many categories of software that lend themselves to different types of explorations. Software can be broken down into Program Genres, from surface and solid modelers to animators and interactive environments, to simple raster based imagery to mention a few. **form·Z** happens to be an extremely strong modeling program with advanced transformation tools which lends itself to architectural design explorations. It is the 3D modeling software of choice for my Advanced Computer Applications Classes and Design Studios. In addition to tremendous modeling capabilities at both accurate and sketchy levels, **form·Z** has a good rendering engine, superior navigation tools, and fair animation abilities. Many who understand the intuitive and exploratory nature of the program are eagerly awaiting the Dynamic Animation Component to **form·Z**, which will lend itself to further explorations.

The Advanced Computer Applications Class was conducted between long sessions. These "mini-mesters" are brief 3 week courses that lend themselves to intensive vignette type design assignments conducted using digital media. I call it "Digital Design Boot-Camp." The premise of the class is to explore design possibilities in the computer and conceptualize it as a forceful design instrument if wielded properly. Students are expected to have a general knowledge of computing but not necessarily have any experience using the software. The rapid acquisition of the skill sets through design vignettes was needed to run refined conceptual exercises and was paramount to the success of this type of class. The level of sophistication in the work produced in this compressed class is impressive considering the collapsing of skill attainment and conceptual jumps that needed to be made by the students in a short period of time.

The Sophomore Architectural Design Studio was more of a mixed media class. The use of traditional physical model making, freehand sketching, and digital constructions were explored. The migration in and out of the digital realm was emphasized. When is it appropriate to leave the digital realm and when is it appropriate to return? These classes are conducted during the regular Fall Semester and afford more time to evaluate and reevaluate the level of integration of digital media at this level. The development of Hybrid media in the description of the process was an interesting way of conceptualizing how to communicate design processes with digital and traditional media.

The assignments revolved around the development of Methodologies based on controlled transformative operations. A single method was first to be designed and developed leveraging



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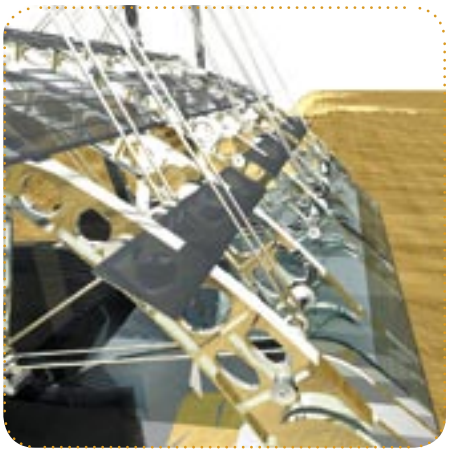
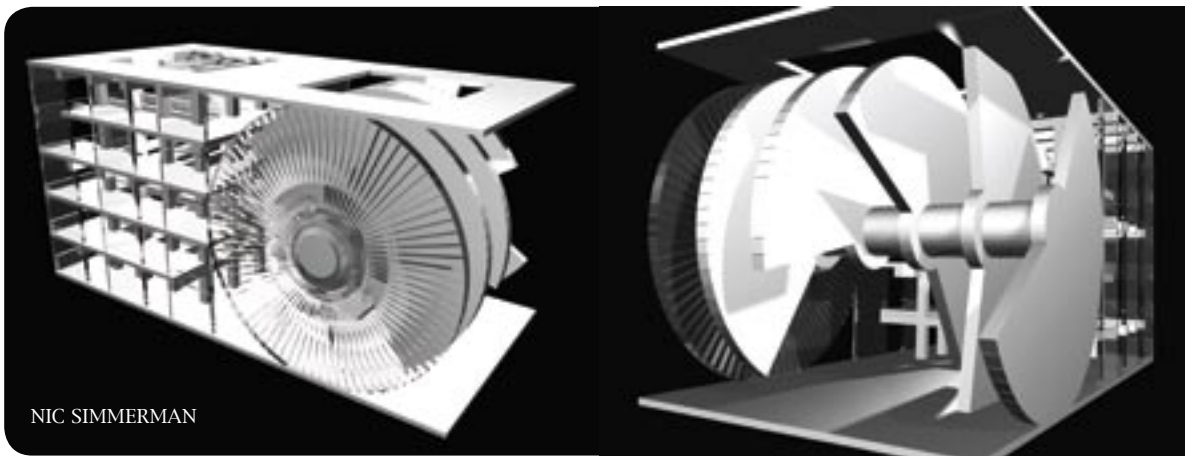


the freedom from physical constraints that the computer affords us. Issues of weightlessness, orientation, densities, and organizational development were explored in the design of this first method. A series of modification exercises helped to refine the project and clarify behavioral characteristics of the system being designed. One of the major concepts of the assignment is to get the students to make a conceptual link between traditional analog design thinking modes and digital techniques. How do you design a system w/ specific and deliberate transformative conditions that lends itself to the design of architectonic spatial constructs? A requirement to design a second methodology that engages the first was introduced to the project later in the semester. The establishment of explicit relationships between the two systems was developed by the students. Each system had to influence the other and begin to establish precise moments of engagement and disengagement. Ideas of dominance and refinement of systems into primary and secondary readings were incorporated into the project. The notion of interdependencies, segregation, integration, and stability were incorporated by the introduction of an anchor component. All three devices were to engage each other and establish new connections and relationships. The idea was to keep the students thinking about relationships that were established, and modification strategies that responded to the introduction of new components. Each student was given the flexibility to design specific associations between each system.

The final phase of the project then moved into a state where the methods and relationships established were leveraged to develop dynamic habitable constructs. Students designed their methods through the development of notations and operations that are used to design these Spatial Constructs. Each Construct incorporated unique ideas for use and program developed by the students. They quickly ran through a series of conceptual models considering topics such as collapsible self-sufficient structures or reversing of anchoring mechanism relationships. They questioned attachment methods and conventional orientations for grounding. The result was the design of a Tectonic Spatial Construct that embodied the characteristics of the dynamic methods designed.



NIC SIMMERMAN

School of Architecture, College of Design
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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?"

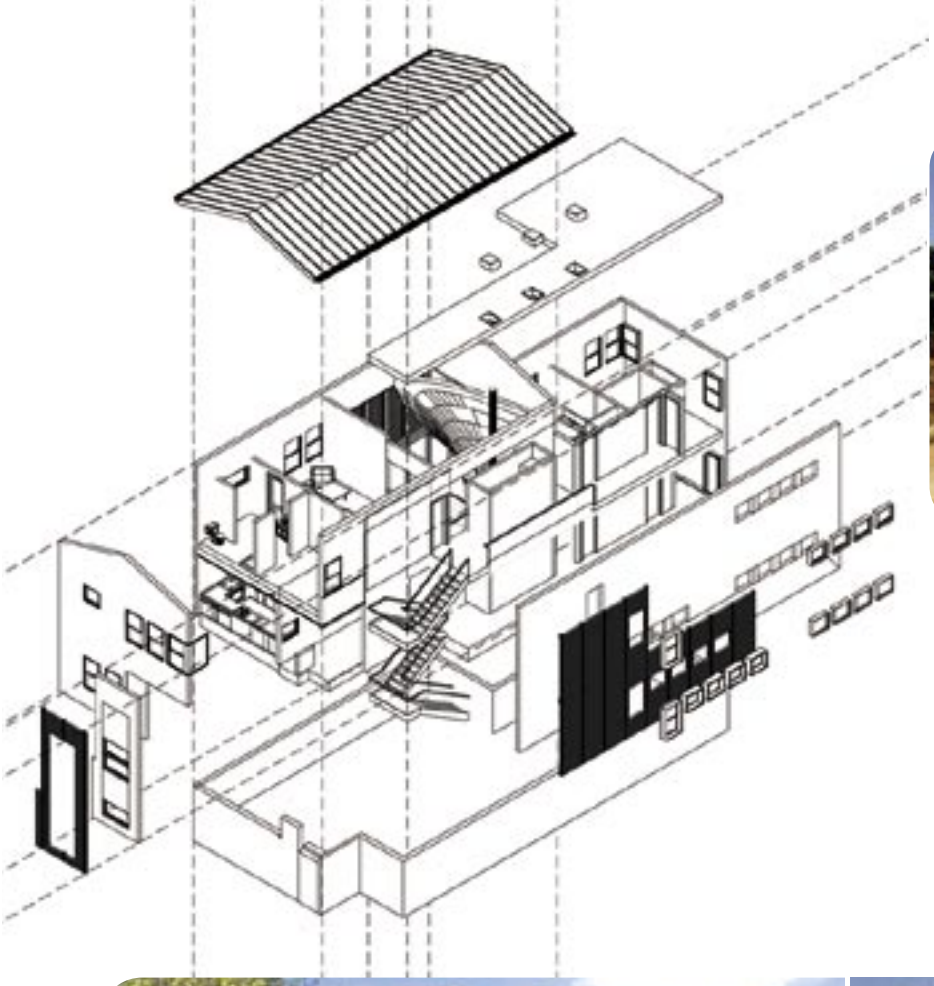
The learning processes associated with digital design and fabrication offers some insight to the future possibilities. Software designers consistently offer what I would refer to as an "intellectual speculation" on the needs of what a given profession–in this case, architecture–requires for producing 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?

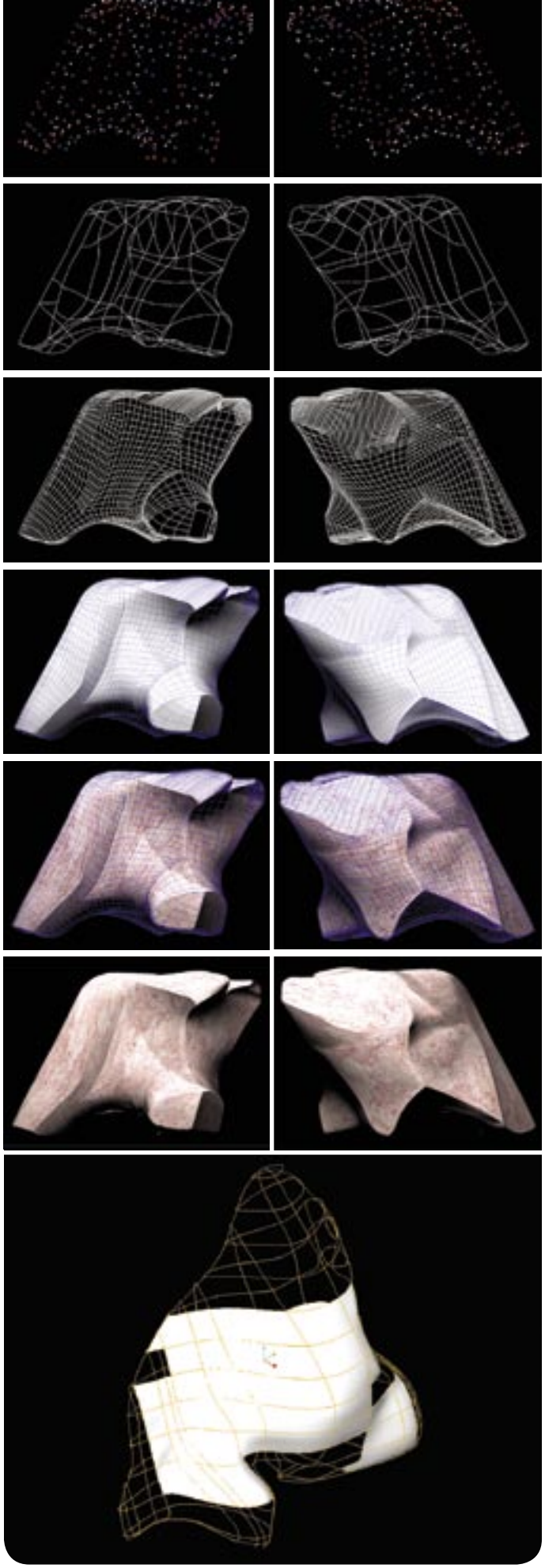
Software today seemingly responds to new materials and methods of abstraction such as stereo-lithography and laser cutting machines, however, the primary limitation of these devices is they stop at scaled-abstractions of real world forces. In order to narrow this gap, a move towards full-scale fabrication 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.

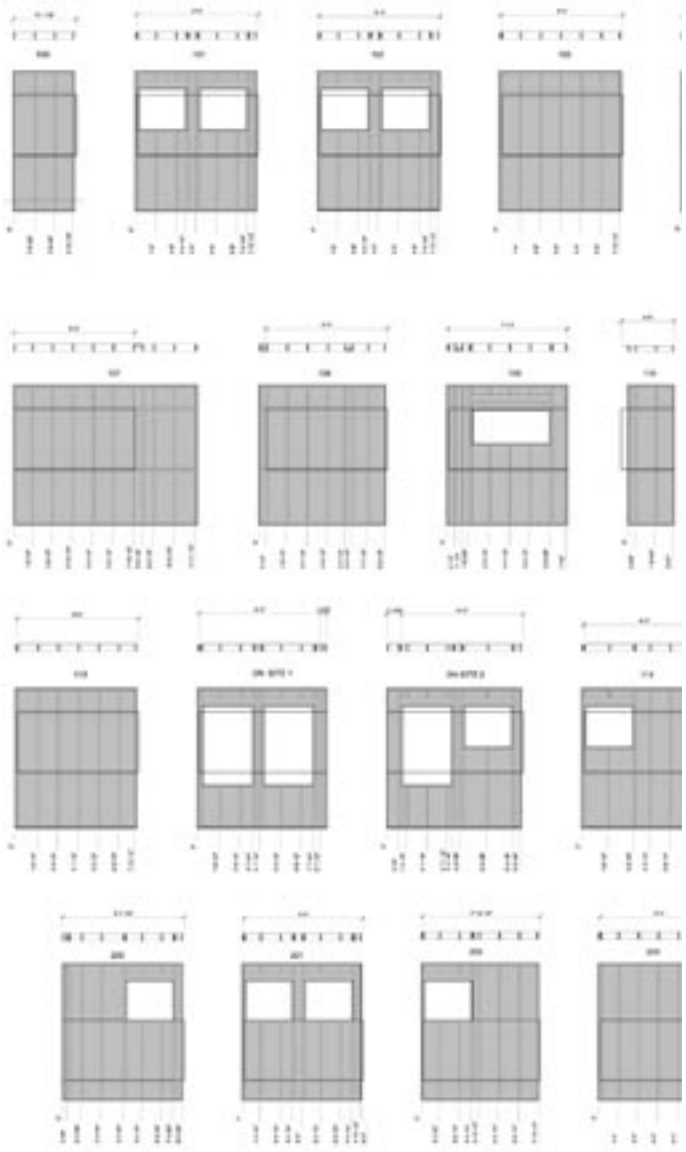
In my teaching and research at the University of Kentucky, College of Design-School of Architecture I am advocating a more collaborative, flexible systems approach to assembly. In order for new forms to emerge within this context, we need to design for real-world, full-scale assembly that would help 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.

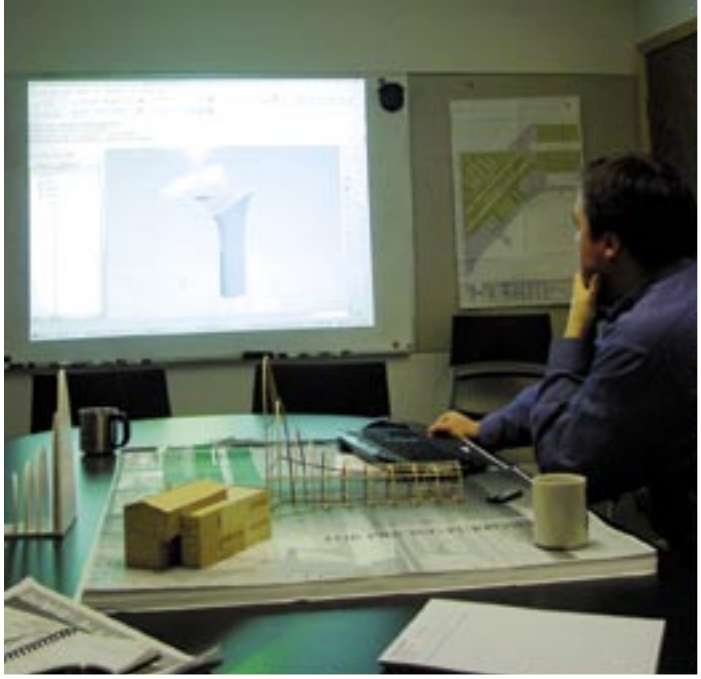


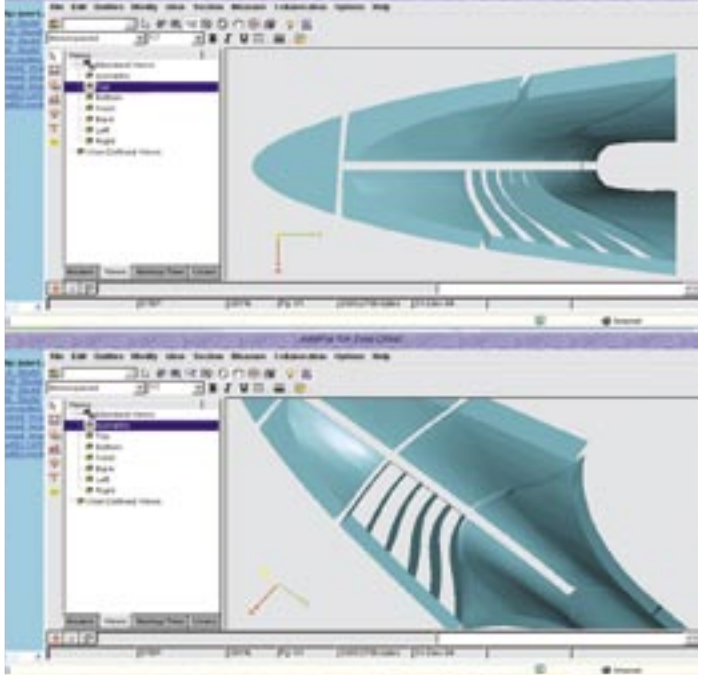
THE RESONANCE HOUSE

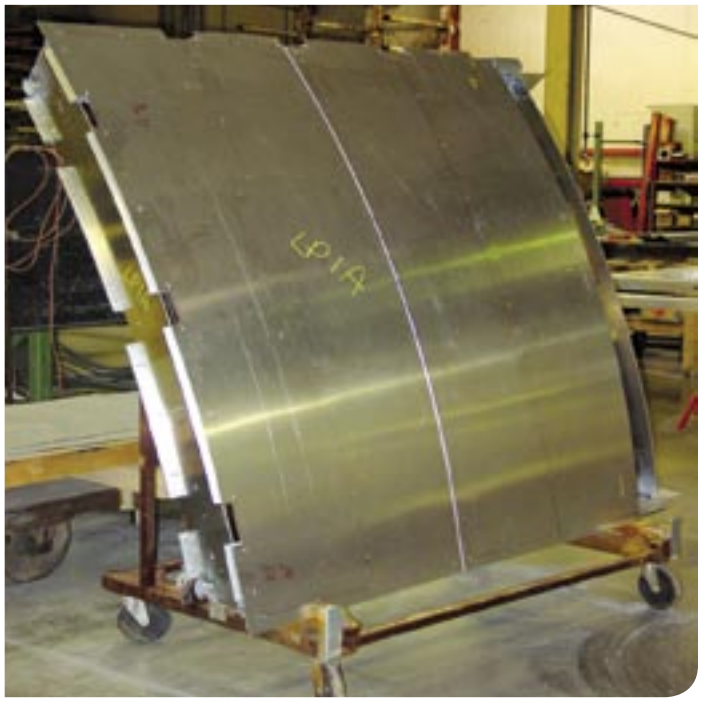
The Resonance House is a contemporary, single-family residence located in the Western Suburb Historic District in downtown Lexington. The project, designed under the direction of Gregory Luhan, a professor in the School of Architecture, and built by his students at the University of Kentucky College 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.







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Magister en Arquitectura, Escuala de Arquitectura
PONTIFICIA UNIVERSIDAD CATOLICA DE CHILE
Santiago, Chile

Conceptualizing the Digital Experiencing Digital Architecture in an Advanced Design Studio

BY CLAUDIO LABARCA ASSOCIATE PROFESSOR,
ARCHITECT PUC, MAGISTER OF ARCHITECTURE

TEACHING ASSISTANT: PÍA MONTEALEGRE AND DANNY BRAVO
STUDENT WORK BY ANDRÉS BERR, UNDERGRADUATE

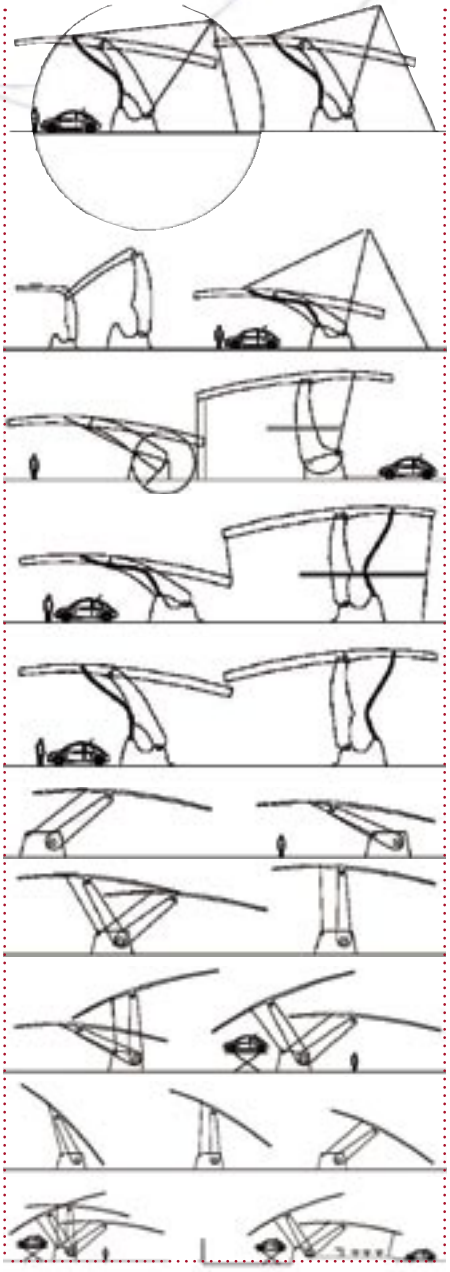
The incorporation of digital technologies in architecture education has opened a wide rage of opportunities for architects and designers. New tools and techniques have been added to the process of space conception and building production. Concepts of parametric modelling, mesh construction and nurbs curvatures, among others, have set new set of formal and functional paradigms in architecture, altering the way we think and conceptualize the process of architecture making.

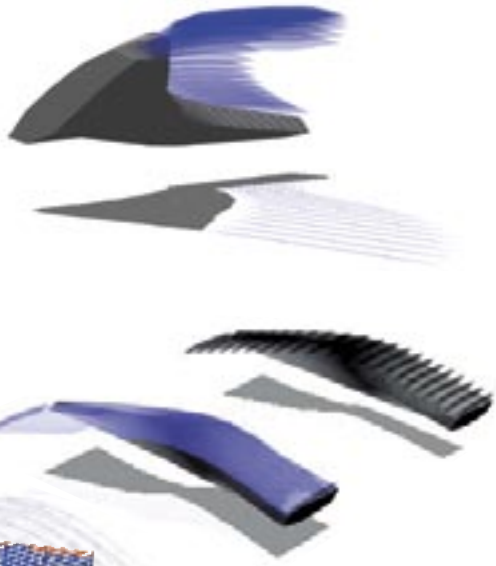
The introduction of **form·Z** in our University has widened our perceptions to this knowledge. Our digital integration in the design process has become ever more dynamic. Now digital construction means integration of information into the architectural three dimensional model. This has revolutionized the way we conceive architecture processes in terms of efficiency and overall control. Digital tools are extremely flexible and open to creativity. Designers can visualize dimensions that were impossible to perceive on the traditional drafting table or in two dimensional environments, where now one can immerse into an overwhelmingly complex and complete three dimensional design.

STUDIO WORK

The introduction of digital constructions within the studio work generally describes a virtual simulation or visual substitute of a real spatial situation. The studio work developed with 4th and 5th year students at our school of architecture, acted as a fruitful place for discussion and exploration of the new possibilities that digital technologies had to offer to architecture. The relation between digital tools and formal processes of architectural design was the starting point of the studio. The student work was developed throughout the constant application of several digital operations intended to solve the formal and constructive materialization of their own architectural proposals. Therefore, the integration of architecture students into the digital process of design conceptualization of architecture and the constructive condition of the digital form were the main objectives developed in this Advanced Design Studio work.

As an excuse to apply new methodologies integrating digital tools in the Design Studio setting, the work was focused in the design of a city's infrastructure for the automobile, solving the programmatic elements directly related to car services such as, car washes, car selling offices, parking buildings, car stations, or mix uses like drive-in, auto-cinemas, car churches, among others.



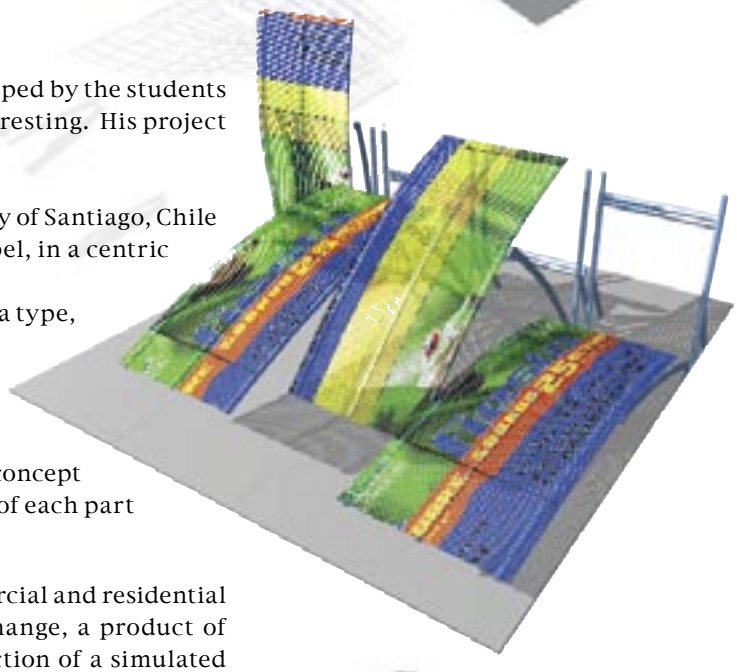


Internet Module for Cars

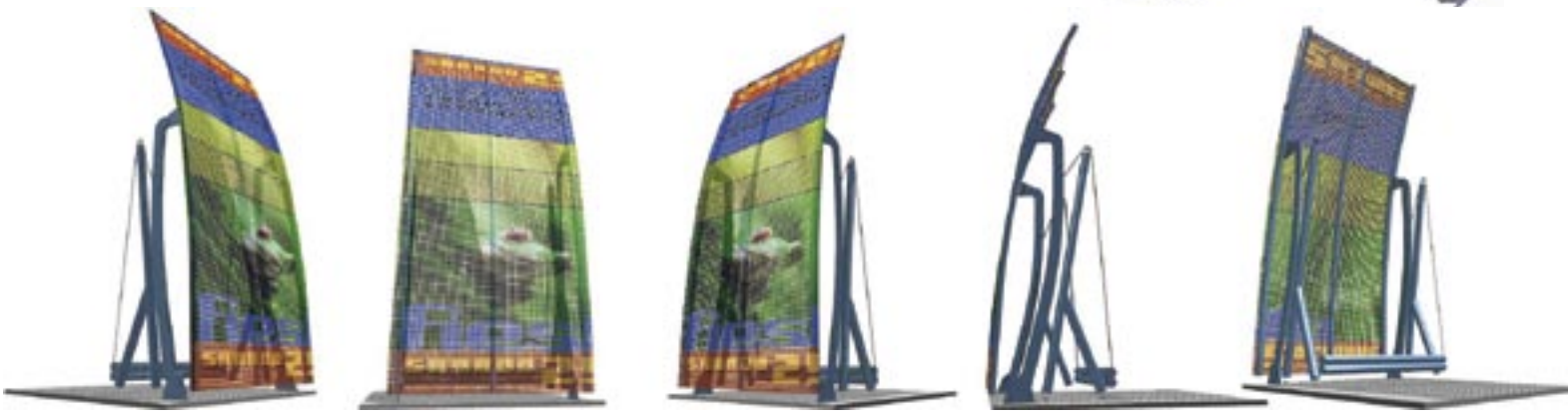
A DESIGN PROPOSAL BY ANDRÉS BERR

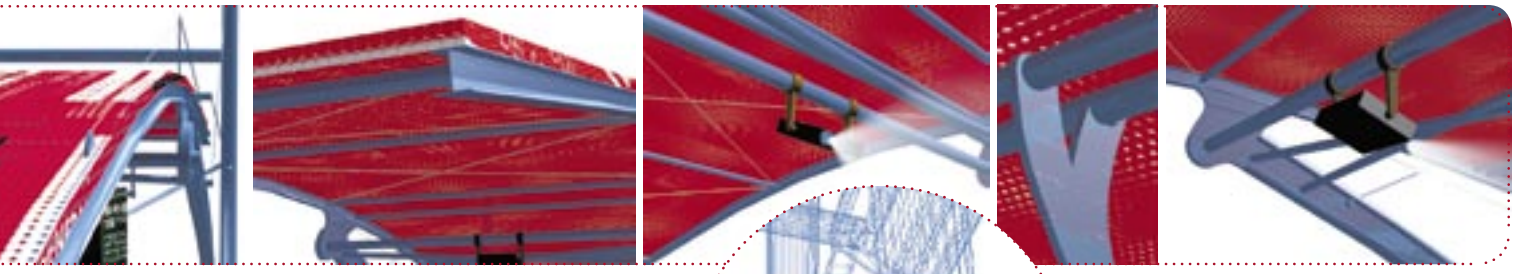
Among the different types of architectonic proposals developed by the students in this studio, the work of Andrés Berr was particularly interesting. His project was developed based on these basic objectives:

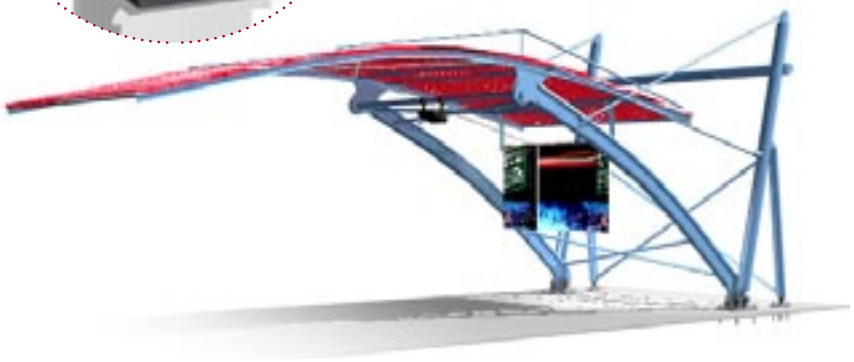
- Urban Simulation: The study of an urban zone of the city of Santiago, Chile where the project will be developed. Avenue Santa Isabel, in a centric zone of the capital city.
- Digital Mapping: The study of an automotive aesthetic, a type, a mark, and a specific model of automobile.
- Digital Translation: Develop an architectonic program related to the automotive activity, defining type and scale.
- Developing Construction Concepts: Application of the concept of "kit of parts", to make possible the serial production of each part that composes the project.



The study of the urban zone revealed a mix of uses of commercial and residential areas inserted within a district in an active process of change, a product of the application of new urban regulations. By the construction of a simulated three dimensional model of the site, students were able to easily visualize the generation of residual lots, a product of an urban area in the process of transition. The generation of residual lots had produced a constant deterioration of the public space, where these pieces of land have mainly developed activities related to the automotive business, such as car sales and all types of motor vehicle repairs, without concern for any architectural intention and design.

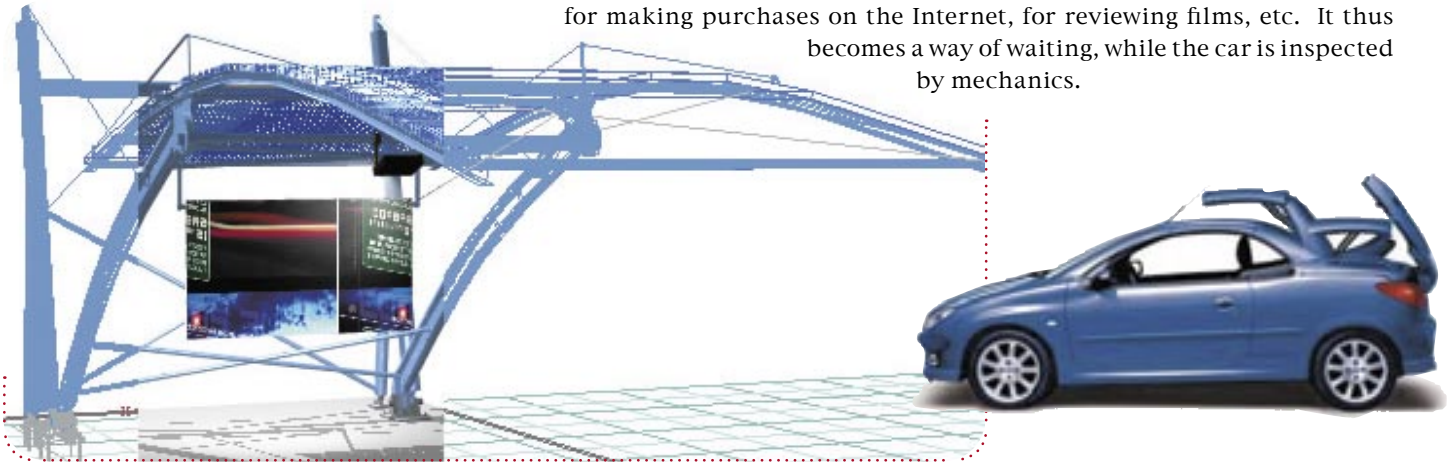


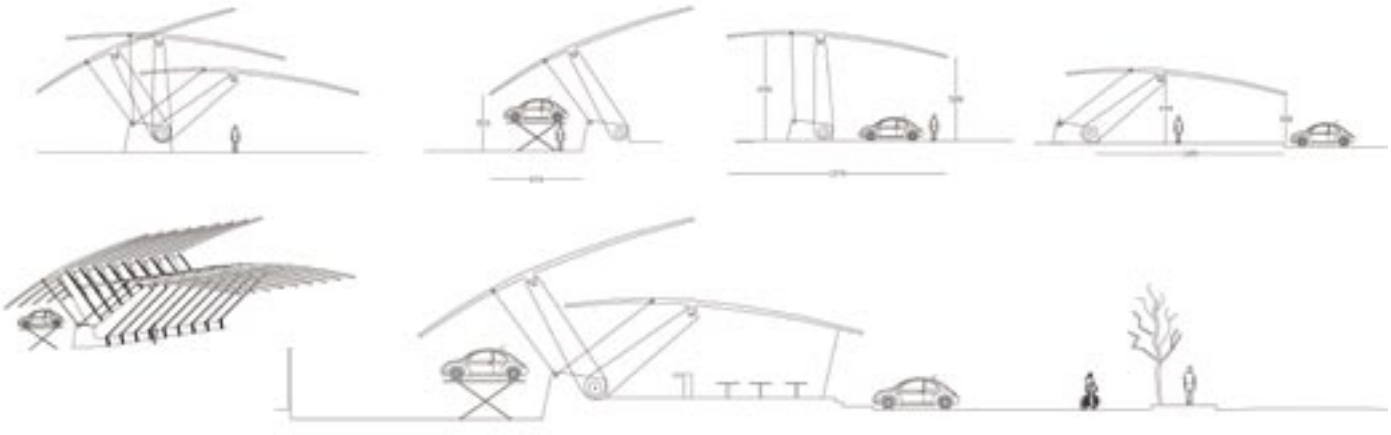




The study of an automotive aesthetic began with the selection of a "car model" in order to find some design clues to be used in the design process throughout, a technique we called digital mapping. Andrés selected the "Convertible Peugeot model 206cc" due to the interest of the folding ceiling that added the concept of mutation and transformation of space. The study began by mapping the car parts and studying all the pieces, movements, and mechanisms related to it that were able to set design possibilities at its interior or exterior.

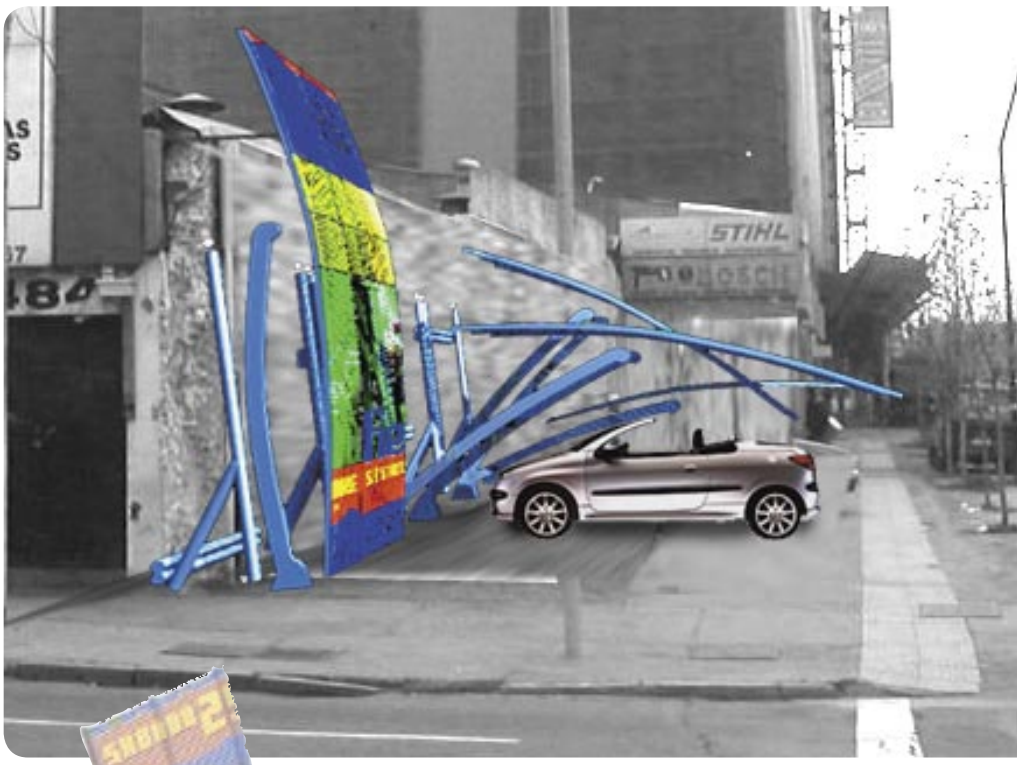
The programmatic proposal for the automotive activity was derived from an exercise that translated the study of this mutable system to be placed at the city's scale of the street. The idea was to give an architectural use to the residual lots located on the site, determining the size and scale of his proposal. The invention of an integrated external multimedia module for automobiles that can be plugged into a car as a way of occupying urban space by a mutable and technological event, was the main idea proposed by the student, answering the needs of a new paradigmatic architectural artifact for the streets. Therefore, the project was defined as a surrounding module that was intimately related to the automobile scale. It preserved the mutable quality of the original convertible system of the folding ceiling and, because of its scale, it has the capacity to be allocated at any residual lot of the site. Slightly besides the car in a temporary or permanent manner, the project's programmatic idea serves as an Internet-Multimedia architectural booth, with the ability to receive commercial publicity within the mobile structure. The idea, primarily, was to create a new space integrated with the automobile, where the new piece and the car became a portable computer connected to internet with all its possibilities and capabilities. It offered ways for making purchases on the Internet, for reviewing films, etc. It thus becomes a way of waiting, while the car is inspected by mechanics.

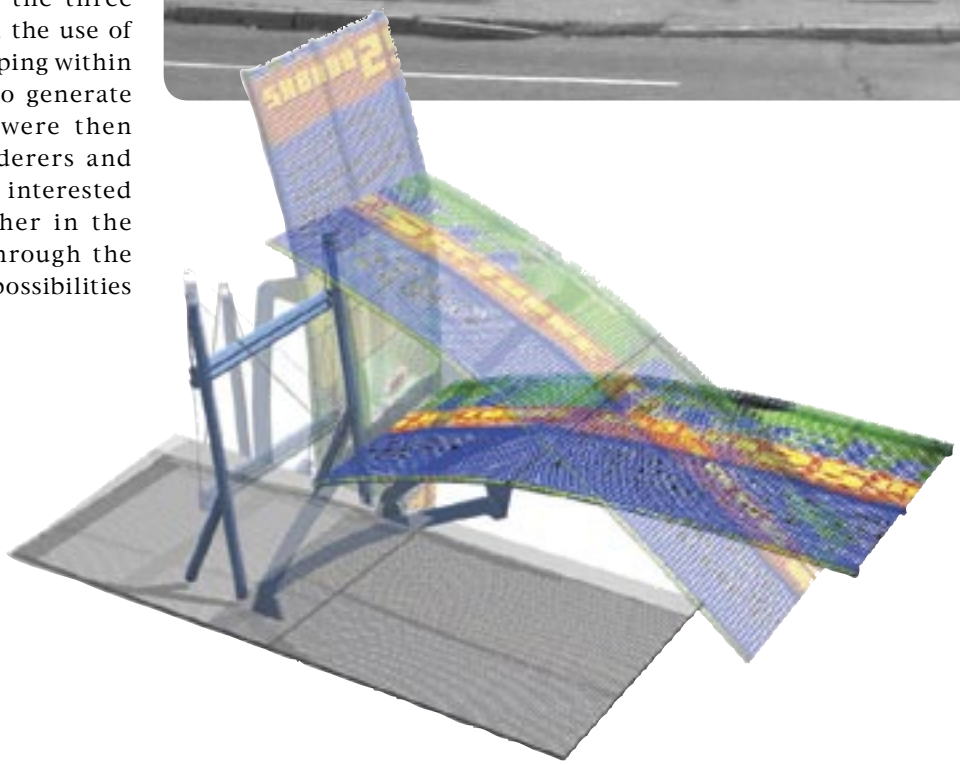




The module was designed as a Kit of metallic elements that can be made with laser cutting systems and CNC machines. Each module works by itself as a system of columns, tensions, and counterbalances. Several modules can be individually set or grouped in order to generate larger size publicity advertising that can be sold as an additional service offered by the module.

form·Z was the tool used for investigating and for solving the movable system of the convertible ceiling of the Peugeot 206cc. It was also used to generate different programmatic applications of the design concept. Operations like extrusion, rotation, repetition, deformation, c-mesh, etc., were fully employed to build the three dimensional model. Also, the use of lighting and material mapping within **form·Z** gave new means to generate representations, which were then exported to capable renderers and animators. We were not interested in photorealism but rather in the correct representation through the most common and direct possibilities of the program.





Urban Mobility Mapping

Magister en Arquitectura, Escuala de Arquitectura
PONTIFICIA UNIVERSIDAD CATOLICA DE CHILE
Santiago, Chile

AWARD OF DISTINCTION
IN URBAN AND
LANDSCAPE DESIGN

ALSO SEE PAGE #6.

BY SEBASTIAN GUEVARA SINCLAIR, MAGISTER OF ARCHITECTURE, PUC
ADVISOR: CLAUDIO LABARCA, ASSOCIATE PROFESSOR

Based on the concept of a rhizomatic composition developed by Gilles Deleuze and Felix Guattari, the Urban Mobility Mapping exercise takes the idea of an organism composed of a series of automated elements, which are intimately connected and dependant on each other, and yet can manage to maintain the idea of a complex and continuously mutating entity.

In this same manner, urban-programmatic behaviors can be approached as a series of complex situations, capable of being descifrated through mapping procedures. The main purpose behind these exercises is to try to understand stationary and movement flows and to be able to use these patterns as a basis for urban and architectural design.

In order to do so, a series of digital tools are used as a means of defining the morphology and inherent structure of the study. These tools are used as an abstract means of development and representation, shifting from an analytical approach to an operative one.

The two main tools used in this exercise are Metaballs (spheres that dynamically change their appearance depending on the proximity of other entities of the same kind and their attraction radius) and Particles (entities that can be used to map the flow of behavior and dynamic interactions).

The first is an entity capable of calibrating the design of an open surface (urban sheet) or a closed envelope (architectural object). The second is used as a flow simulator, capable of representing smooth or abrupted interactions between diverse elements and forces.

In both cases, certain parameters must be previously set. Specially with the use of metaballs, these parameters can determine the type of operation, analysis and formal result, as well as the programmatic characteristics of the object. In order to define such programmatic conditions, these shape-shifting spheres can be separated in two areas:

Static Programmatic Space: The amount of constant people that the entity can hold in its interior. For more people, the diameter of the metaball increases.

Variable Attraction Radius: The capacity of the entity to hold a larger number of people, activities, or transitory situations. Two or more metaballs may share attraction radius, deforming each other and giving way to hybrid spatial and formal configurations.

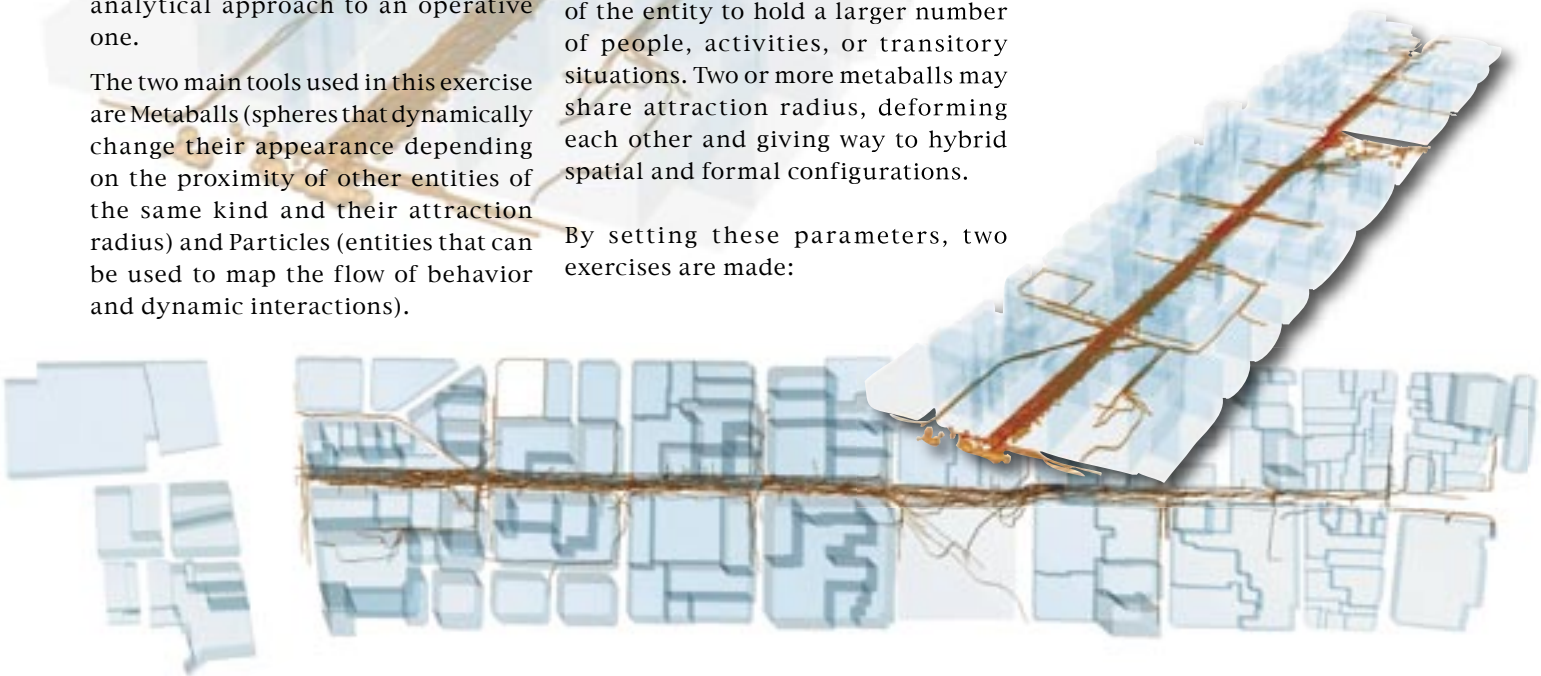
By setting these parameters, two exercises are made:

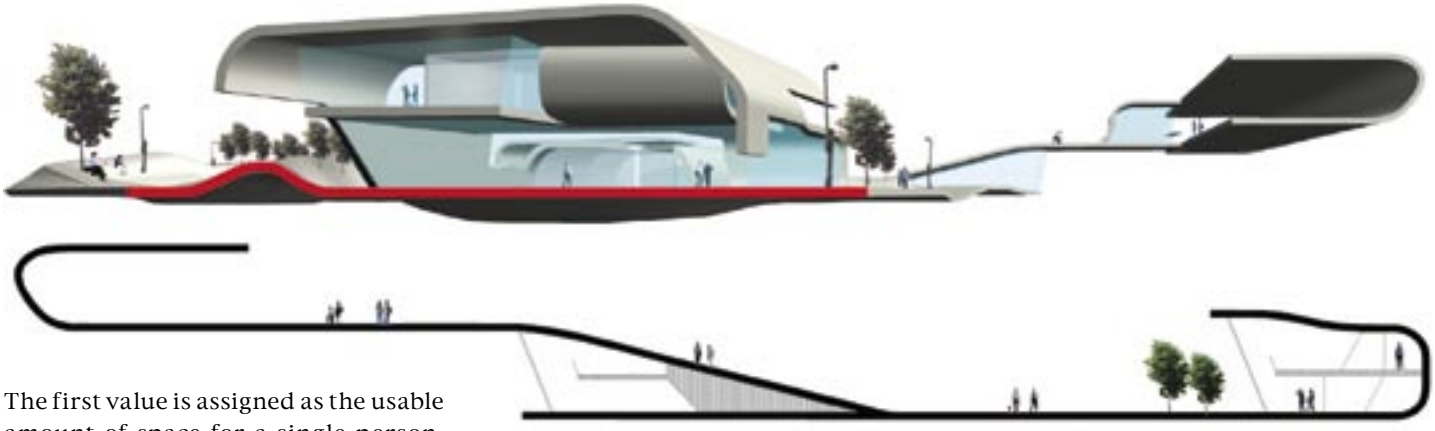
1. URBAN MOBILITY MAPPING

One of the most highly traveled avenues of Chile, the Paseo Ahumada, was used as the context for this mapping exercise. The exercise takes place at the most chaotic time of day, between 7 and 8 pm (when everyone leaves their office and walks towards the subway), for a period of 5 consecutive days. A total of 30 people are mapped daily, obtaining an average map of flows at the end of the week.

By following (stalking) each person and assigning a singular path to each one, a series of individually extruded lofts are created. Afterwards, an average of 30 behaviors are selected and visualized as a complex and interlaced surface.

For the second part of this exercise, metaballs are used as a means of mapping people in a stopped stance. A value is assigned to each individual, both the Static Programmatic Space and the Variable Attraction Radius.

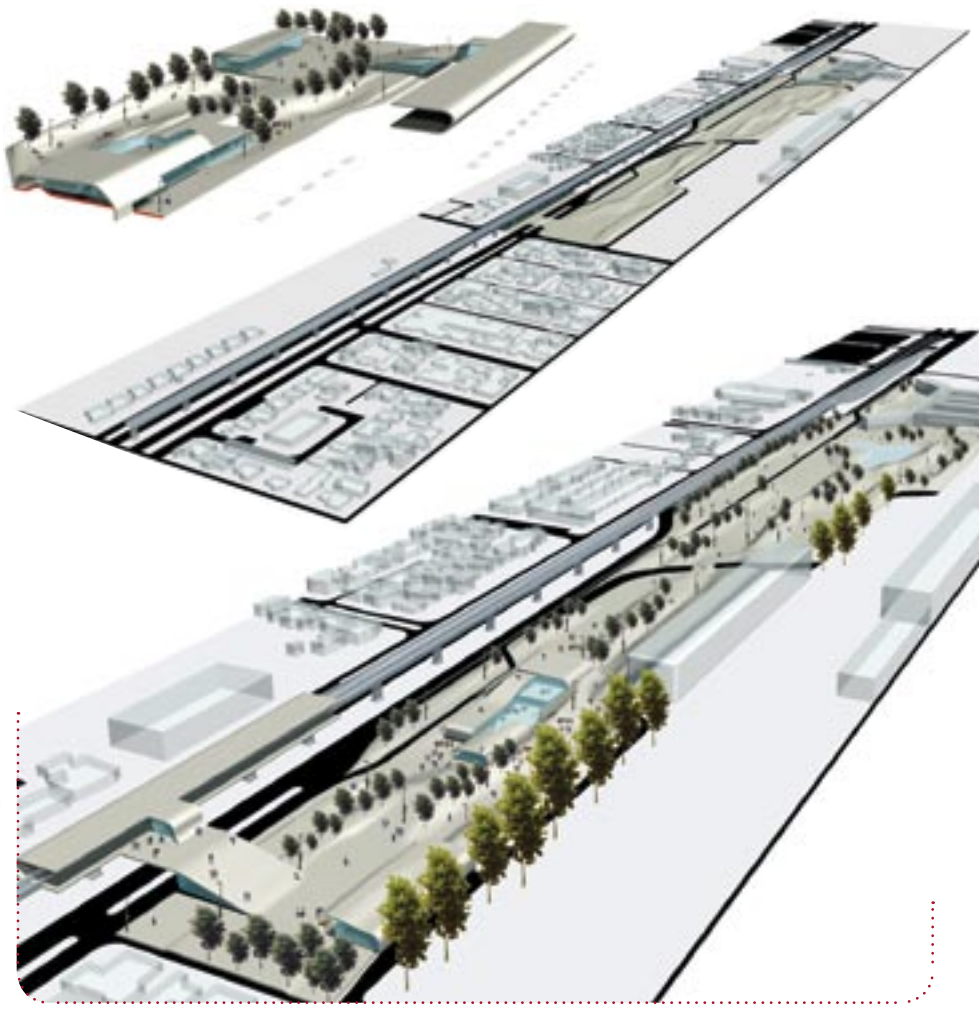


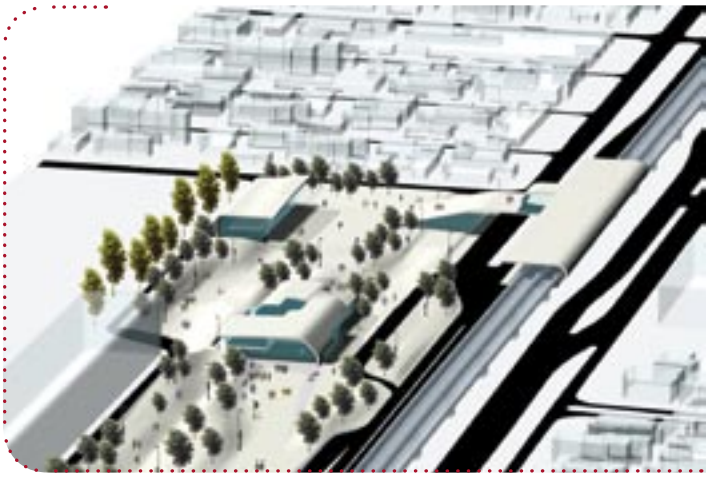


The first value is assigned as the usable amount of space for a single person, while the second value represents the interaction between two or more people. Afterwards, the two mapping exercises are overlapped, displaying a formally complex set of entities that represent both alternating paths of movement and buffer zones.

The third part of this exercise uses two different tools: Contours and Nurbs Surfaces.

Operating over the overlapped surfaces, a sequence of parallel sections are created, which are then re-traced using Nurbs Curves. These new paths are then converted into a singular and striated surface, one capable of assimilating the mapping exercise in its shape. This new surface can then be adopted as the starting point for an urban intervention, one that can express free-form human movement in both the analytical process and formal conception.





2. PROGRAMMATIC DATA DESIGN

Following a procedure similar to the first exercise, this second one focuses on the operational and more formal approach that maintains the conceptual analysis based on free-form entities, such as metaballs.

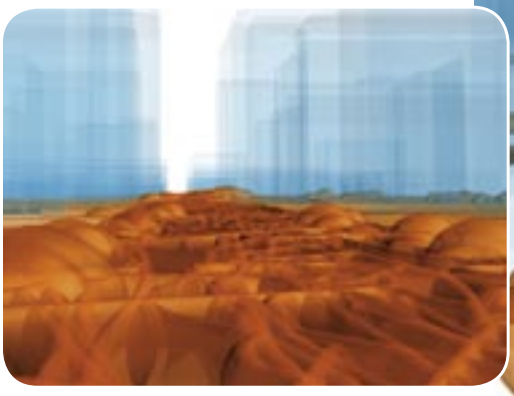
Defining a value for both the Static Programmatic Space and the Variable Attraction Radius, a strategy for urban design and a school project are developed. The main purpose of this strategy is to relate human mass to programmatic space. To do so, a chart is created, assigning each particular programme a static and a variable value.

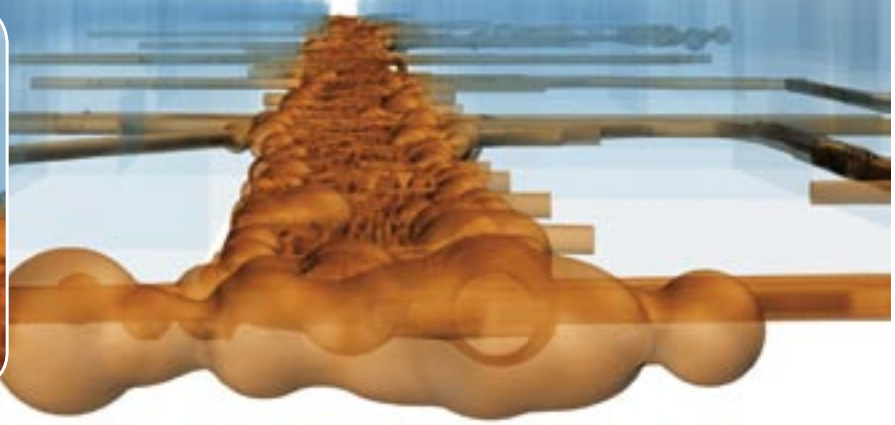
Afterwards, each metaball that contains a certain amount of human mass, is placed and forced to interact with other entities of the same kind, resulting in endless iterations of conceptual form and diagrammatic spatial configurations.

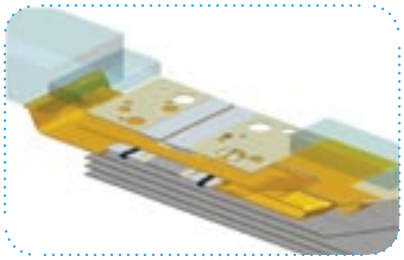
Out of this iterative process the best stance is selected and used as the starting point for a formal intervention. These metaballs are then used to manipulate and deform the topographic layout of the project site. By means of the contours and nurbs tools, the topography is re-created, injecting a working approach to the new landscape.

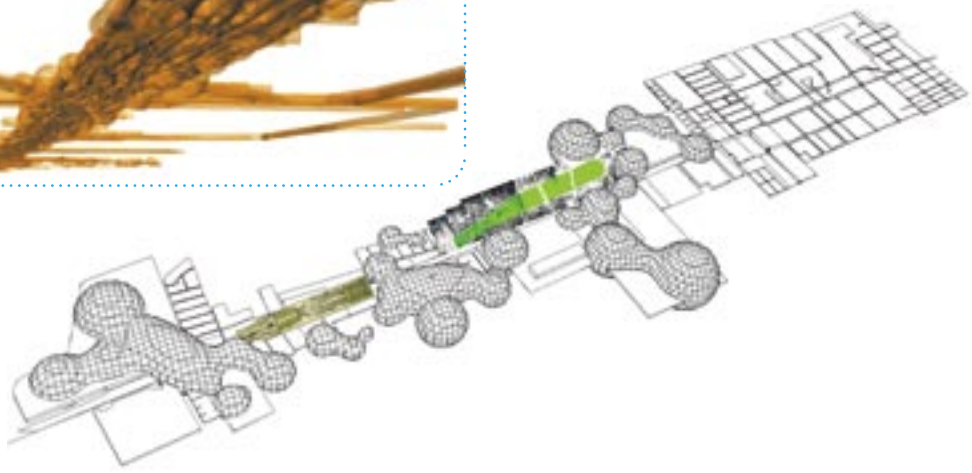
A similar procedure is then used to design a small elementary school. After assigning only human values to each metaball, they are used to deform a static surface. These free form entities enter the same iterative process, until a certain stance is selected. Each programme of the elementary school is then related to the amount of children it holds, as well as to a close interaction between each programmatic cell. After the mapping exercise is developed, the project is traced by means of nurbs curves, loft, or c-mesh surfaces, borrowing data from the diagrammatic study.

An operative approach of this kind merges human intervention and behavior with a static field. The result can be described as a complex space defined by its own set of parameters, logic, and entities that compose it. This can be considered an approach for identifying and stratifying new agents and variables that reveal new tools and project complex instances of human and architectural interactions to the landscape.









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Modeling Flexible Mars Greenhouse Prototypes

BY J.M. MAZE,
ASSISTANT PROFESSOR

ABSTRACT

An interdisciplinary team of designers and researchers are rethinking the design for initial deployment greenhouse modules for the first Martian exploration in order to test the viability of growing enough biomass to support life. Researchers wanted a new model from outside the established aerospace industry's mode of thought in order to question existing strategies for greenhouse design. The resulting schematic ideas awaiting further evaluation represent an architectural sketch for a small modular growth chamber for the surface of Mars.

INTRODUCTION

Typical to the architectural design process is the notion of the sketch problem. It involves profuse amounts of brainstorming, coffee, wads of paper, pencils sharpened down to nubs, and sleep-deprived faculty and graduate students. Throw into the mix a collection of laptops loaded with state of the art modeling and visualization software and you get a fairly accurate depiction of the design process launched to begin rethinking the Case for Mars strategies which begun with the Space Exploration Initiatives. What began as a joint endeavor between faculty and graduate assistants from architecture and molecular biologists and geneticists to digitally visualize designs for small growth experiments to be sent to Mars atop a small lander expanded into discussions about a different concept for larger greenhouse modules as seen through the eyes of architects.

This design process for initial deployment greenhouse systems, nicknamed GRUBs, represents an interdisciplinary research and development project involving scientists, faculty, and researchers of a NASA-sponsored center at the University of Florida, Space Agriculture and Biotechnology Research and Education (SABRE), the University of Florida School of Architecture, and the Rinker School of Building Construction. Beginning with the position that sustained presence on Mars will require a renewable food source grown in Martian regolith, the design team set out to develop an expandable, modular system that can be adapted to the irregular planetary surface and, due to its geometric structure, withstand the extreme conditions endemic to a reduced interplanetary atmosphere. Artwork depicting other design concepts by Akira Ohkubo, Cho Jinsei, Robert Murray, and principally Carter Emmert's work from the Case for Mars II Conference was carefully considered by the graduate research team in an effort to understand the complex issue of creating safe habitats on the hostile surface of Mars.

The initial agricultural environments on the surface of Mars will need to be modular and adaptable systems flexible enough to fit in a relatively small payload yet strong enough to endure extreme conditions. These structural systems will need to be easily assembled by astronauts with somewhat compromised dexterity in Extra-Vehicular Activity (EVA) suits, yet strong enough to withstand sustained winds and reduced atmospheric pressure. The membrane of the system will need redundancy in case of meteorite projectile penetration and be flexible enough to operate either as a translucent light-emitting skin or a projective opaque skin supporting artificial growth illumination within.

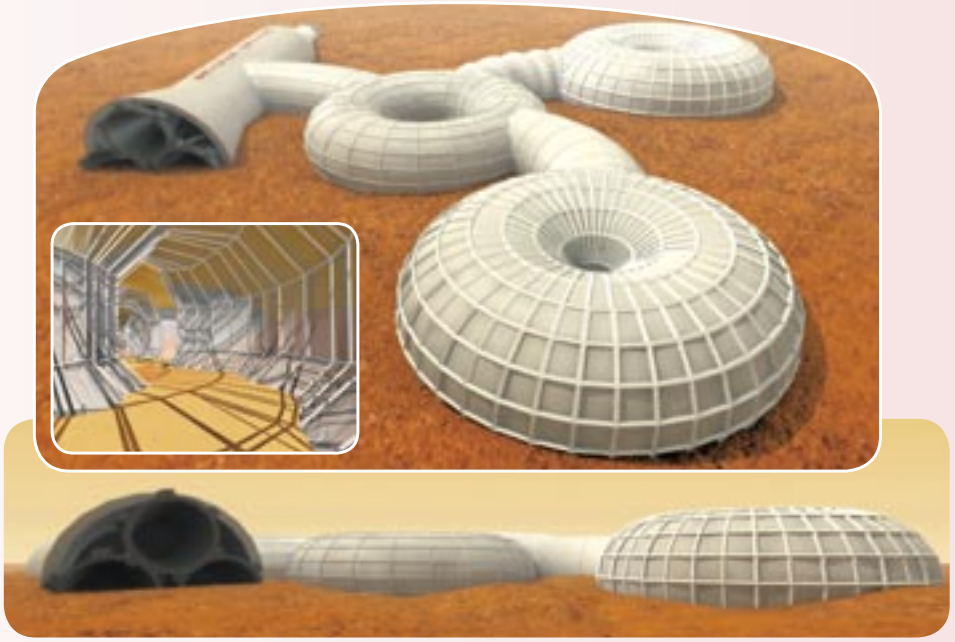


FIGURE 1, 2:
VIEW OF MODULES SET INTO SURFACE OF MARS. SOA/SABRE

FIGURE 3: EARLY CUTAWAY SKETCH OF FACETED MODEL SET INTO REGOLITH. SOA/SABRE

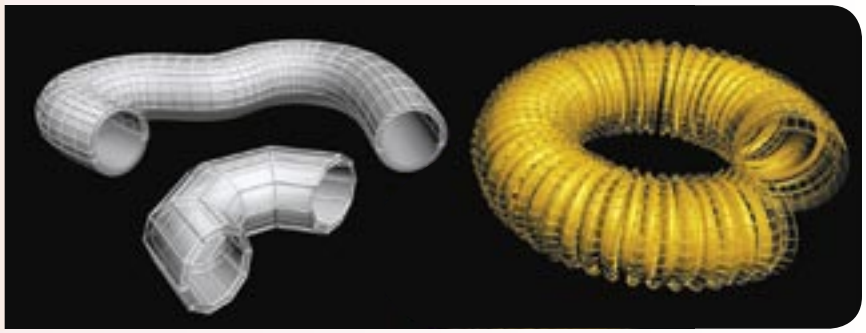


FIGURE 4: EARLY MODELS DEMONSTRATING VARIOUS SHAPES. SOA/SABRE

PROCESS

The goal of the project is to rethink the given shape and structure of Martian greenhouse design. As an architect and educator, the thought process is inherently different than that of an aerospace engineer solving the problem of providing suitable space for the growth of crops for a settlement on Mars. At the onset, the design team began to seek out biological forms and systems for inspiration while researching previous schema for Martian outpost architecture.

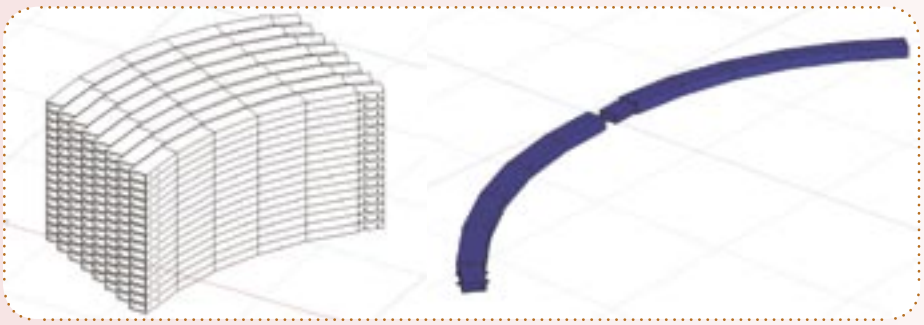


FIGURE 5: RECTANGULAR SECTIONED VERSION DISASSEMBLED.

FIGURE 6: RECTANGULAR SECTIONED VERSION IN QUARTER SECTIONS.

The precarious fragility of a solely-inflated greenhouse structure in a thin atmosphere abundant with meteorite debris became immediately apparent. Instead of deriving inspiration from mechanistic sources, the architectural team looked to nature for geometric and systematic ideas of how to rethink what in previous schemes tended towards large inflatable domes and buried tubes. Based upon biological cellular structures and commonly found constructions in nature including the formal language of red blood cells, bacteria, and spores, the GRUB structures are designed to operate to resist wind shear in the X,Y, and Z axes of impact based upon a cylindrical tubular design rather than the previously prevalent vision of domed greenhouse structures.

The torus shape of the greenhouse modules is based upon the outward resistance that circular geometry provides against the wind load of Martian dust storms. If properly grounded into regolith berms, winds will be channeled up and over the greenhouse, exerting in the process a downward thrust not dissimilar to the aerodynamics of a racecar. The bermed regolith at the bottom prevents uplift that could destabilize the structure. In plan, the circular shape also will channel winds around the structure. Using a rigid frame in addition to 5psi inflation will help maintain the shape of the structure so that the aerodynamics can function properly.

The ring shape, rather than a lozenge shape, allows one of two things to occur, depending on the particular needs of the settlement. The first consideration for whether to leave the center a void revolves around the thought that, by filling the central space with packed regolith, the resulting mass would act as additional structure to anchor the greenhouse to the surface. This would aid in resisting the wind force of the dust storms. A lens-shaped dome that lies flat and close to the ground rather than a semi-circular dome would also reduce the effects of winds (1), but would require a much larger payload of structure and material for an early initial deployment greenhouse environment.

The other consideration is that, with a domed or lozenge shaped structure, there will be a dark side of the greenhouse unsuitable for plant growth. This factor is predicated on a translucent skin to allow for light transmission rather than an opaque one. At this point, the design team was instructed to not base a model upon the transmission of light, and to base decisions on other factors. The assumption is that either a translucent PBO skin with adequate filtration of UV radiation or an opaque skin with a light-emitting system of LED illumination will be developed.

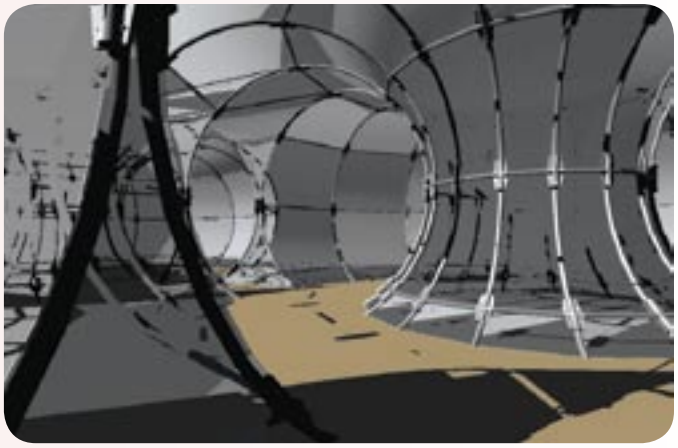


FIGURE 7: VIEW INTO INTERIOR FILLED WITH REGOLITH.

The composite tubular structure affords an unforeseen flexibility in deployment, allowing for closed torus-shaped assemblies as well as irregular, curvilinear arrangements to respond to Martian geology. The ring shaped structural ribs allow for a highly flexible and expandable system. The interior volume is increased by adding more ribs and increasing the radius of the greenhouse. Additional sections of the endo-dermis and exo-dermis can be zipped into place in order for the space to expand.

The ring shape provides a structural integrity not easily possible, or as efficient, as with rectilinear structural shapes. The geometry also allows for sections to be assembled as tubes rather than rings for circulation corridors or connector pieces. Each ring is stored in payload as quarter sections, stacking vertically and nesting horizontally in transport. The rib sections are gently facetted rather than curvilinear for the sake of providing straight sections of tube where they connect together to form the complete rib.

Polybenzobisoxazole (PBO) fiber composite comprises the bulk of the structural shapes. PBO is stronger than the previously used Kevlar, and has decreased flammability in oxygen enriched environments (2). The structural ribs, telescoping struts, and connector struts can all be made of PBO to reduce weight in transport. The skin is comprised of redundant layers of PBO fabric 1 mm thick. The exo-dermis layer could see an additional thickness for shielding UV radiation and meteorite projectiles. The goal in material and modularity selection was maximum strength, compactness and adaptability as well as interchangeability of parts for longer-term maintenance.

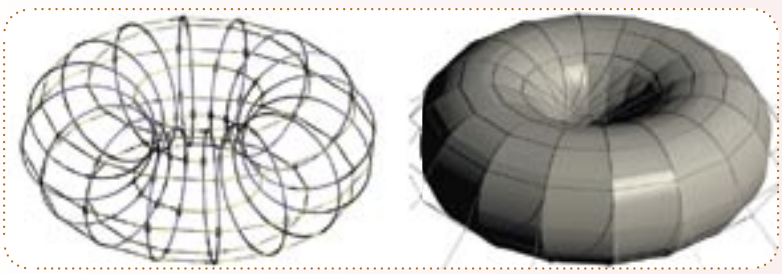
DEPLOYMENT

The first stage of assembly involves the zipping together of the exo-dermis and inflating it. This creates an inhabitable staging area for erecting the remainder of the structure. The second stage of erection is the assembly of the ring shaped structural ribs within the exo-dermis. Telescoping struts are attached to the ribs by a coupling that also reinforces the joint between rib quarter segments.

The third stage of assembly is the unfurling of the endo-dermis within the structural ribs and zipping it together. This dermis is then inflated as a bladder which, as it expands, pushes the structural ribs into place and snaps the telescoping struts to their optimum length. At maximum inflation, the endo-dermis sandwiches the structural framework between it and the endo-dermis, providing additional rigidity and stability. The redundant skins decrease the chance of deflation due to meteorite penetration.

The fourth stage of assembly entails the berming up of regolith against the lower portion of the outside circumference to resist uplift. Regolith would also be carted into the interior of the GRUB greenhouse module for growth. This additional mass would act as ballast while providing a flat walking surface while crops are planted and tended.

The final stage of assembly is the addition of the tie-down anchors. The tie-down cables are braided nylon fiber that essentially drape across the top of the greenhouse module like a spider's web and attach to aluminum anchors embedded into the surface. Several GRUB greenhouse modules can be clustered together and joined with an integral joint system (Fig. 8). This allows for segregation of crop typologies or of uses for each GRUB module.



FIGURES 8, 9: SINGLE ISOLATED GRUB FRAME WITHOUT SKINS, AND WITH SKINS AND TIE DOWNS.

CONCLUSIONS

The intention of this research and sketch problem is to show that a highly transportable and adaptable system can serve to initially test the viability of growing edible biomass using the Martian regolith. If proven successful, then larger-scaled growth environments could be transported and assembled to support larger exploration teams. It is too early in the schematic design phase of this sketch problem to ascertain the viability of such a strategy, however these models are proving highly useful as catalysts for discussion and debate with researchers at IFAS and KSC. GRUBS is a relatively simple idea conceived with rigorous naivety from outside the aerospace engineering community. Perhaps an idea such as this, based upon the concept of biomimicry, could offer plentiful solutions to the dramatic challenges facing a mission to the red planet.

REFERENCES

Orndoff, Evelyne, (1995) Technical Memorandum 104814 Development and Evaluation of Polybenzoxazole Fibrous Structures, NASA Center for Aerospace Information, Maryland.

Zubrin, Robert (1997) The Case for Mars: the plan to settle the red planet and why we must, Touchstone, New York, 195.

Anonymous, (2004) The Vision for Space Exploration February 2004, NASA Center for Aerospace Information, Maryland.

Schuerger, Andrew C., (2004) Microbial Ecology of the Surface Exploration of Mars with Human-Operated Vehicles

Kieffer, H., Jakowsky, C., Mathews, M., (1992) Mars, University of Arizona Press, Arizona.

FIGURE 10: VIEW OF JOINED GRUB GREENHOUSES, LIVING MODULE OR SPACECRAFT REMOVED FOR SIMPLICITY AND DETAIL OF CONNECTOR SLEEVE.

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Transforming Habit

BY JASON CARMELLO, FOURTH YEAR
ADVISOR: BETH BLOSTEIN, ASSOCIATE PROFESSOR

The realm of architecture is often bracketed by the typical assumptions that buildings are to be produced on the earth, similar to artwork on a canvas. This assumption often overlooks the importance of human perception or, more specifically, human interaction. Since architecture has the ability to directly affect our lives, why not question its boundaries and focus on personal interaction?

> "...buildings are appropriated in a twofold manner: by use and by perception–or rather, by touch and sight. Such appropriation cannot be understood in terms of the attentive concentration of a tourist before a famous building. On the tactile side there is no counterpart to contemplation on the optical side. Tactile appropriation is accomplished not so much by attention as by habit. As regards architecture, habit determines to a large extent even optical reception."
>
> --Walter Benjamin, *The Work of Art in the Age of Mechanical Reproduction*.

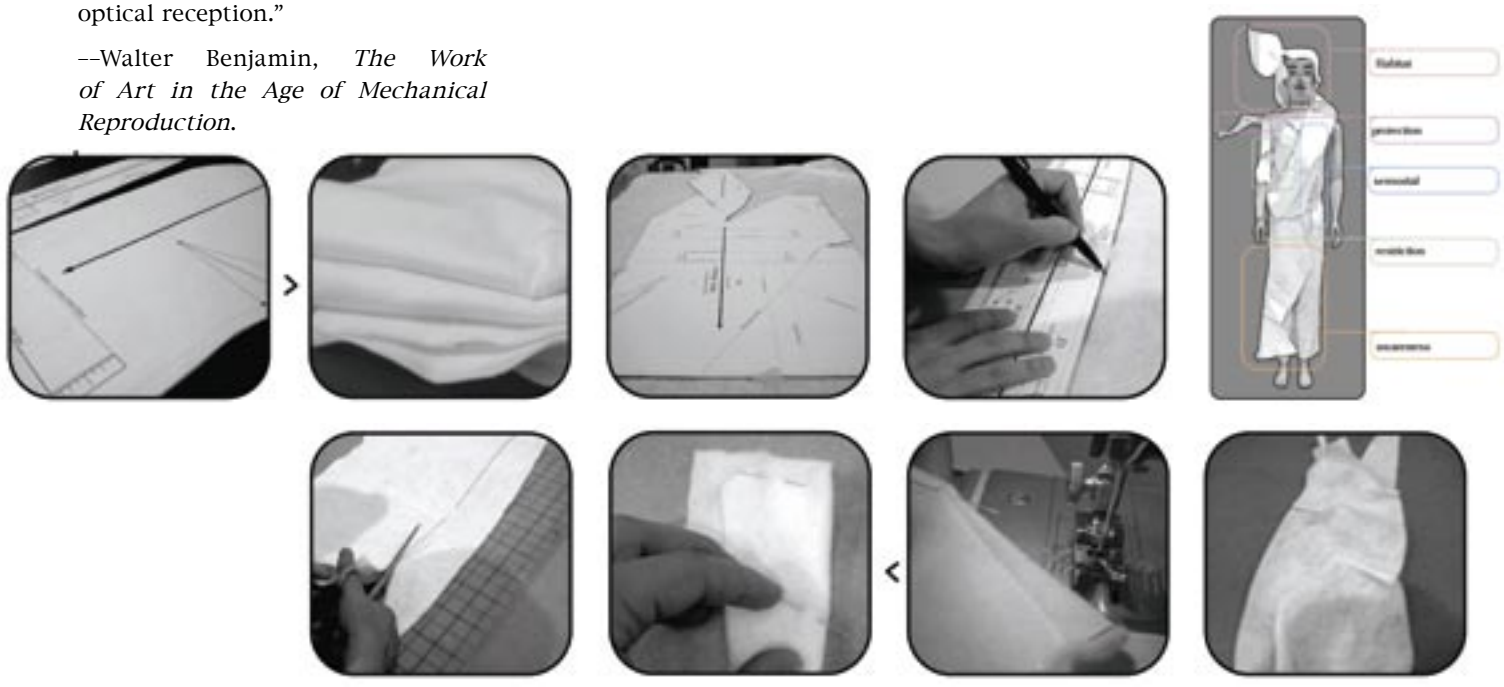
From the readings of Walter Benjamin, one must begin to ask themselves:

1. To what extent can architecture affect us physically?
2. Have we been trained to use spaces as those who have used them before us?

These two questions become the basis for this project.

Just as architecture is layered in varying possibilities, so is the term habit. The most common conception of the term deals with repetitive activities–for example smoking, excessive eating, biting one's nails, etc. Habit also has several historical meanings, which relate directly to architecture. For example, according to Webster's dictionary, habit can be defined as:

1. archaic : CLOTHING
2. a costume characteristic of a calling, rank, or function <a nun's habit> RELIGION
3. manner of conducting oneself : BEARING
4. bodily appearance or makeup <a man of fleshy habit>
5. the prevailing disposition or character of a person's thoughts and feelings : mental makeup
6. a settled tendency or usual manner of behavior
7. a behavior pattern acquired by frequent repetition or physiologic exposure that shows itself in regularity or increased facility of performance b : an acquired mode of behavior that has become nearly or completely involuntary c : ADDICTION



III. Mental constitution, disposition, custom.

4. Bearing, demeanour, deportment, behaviour; posture. *Obs.*

8. The way in which a person is mentally or morally constituted; the sum of the mental and moral qualities; mental constitution, disposition, character.

9. a. A settled disposition or tendency to act in a certain way, esp. one acquired by frequent repetition of the same act until it becomes almost or quite involuntary; a settled practice, custom, usage; a customary way or manner of acting. (The most usual current sense. Properly said of living beings; in mod. use occasionally of inanimate things.)

d. ***in the habit (habits) of doing*** something: having a habit or custom of so doing. So ***to fall*** or ***get into the habit***.

Habit - Patron Saints Index

The uniform worn by religious communities. It is designed to bring the religious closer to God through daily obedience, by giving up of the freedom to wear other clothes, and by eliminating the worry and temptation of focusing on clothing. By wearing a habit, religious form a 'habit' of obedience to God that can be used in other parts of their lives, are ever reminded of their association with their order, and of the meaningless of outward form, and become a constant witness to the outside world who are reminded of the religious' vocation by sight of the uniform. Phrases like "taking the habit" or "assuming the habit" are synonyms for joining a religious order.

In response, this ten week project was an investigation centered on the habitual tendencies of humans manifested in architectural form, fashion, and clothing. Using smoking as a model, an anthropomorphic computer model is formed with the intent that its full-scale physical fabrication will both enable and bring an acute awareness to the habit and its affects on both the body and space.

By studying habit as clothing, one can discuss principles that parallel architecture. In fact, one of the fundamental aspects of architecture is to enclose or protect–a property very similar to that of clothing. Transforming Habit aims to question the typical perception of architecture, while studying principles that typically parallel it. In addition, the project combines clothing with a study of addiction. In the case of Transforming Habit, this addiction is the habit of the hand-to-mouth action (smoking, excessive eating, etc.) Rather than encouraging extinction of one's habit, the project is intended to create an awareness of habit. By creating awareness, one can begin to address if changes need to be made. Without awareness, the habit will unconsciously continue.

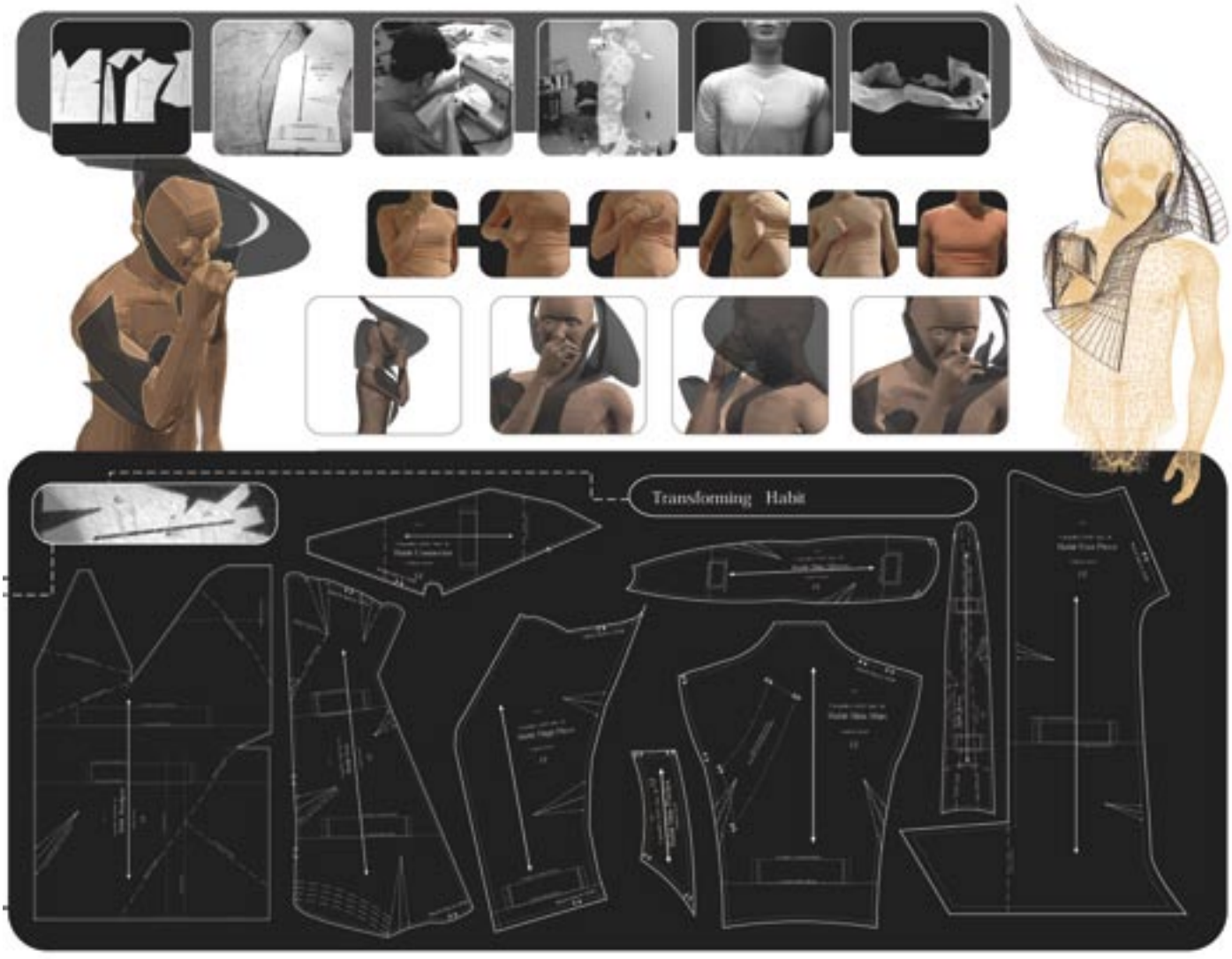
One of the common characteristics about clothing production is the play between customization and standardization.

The customization process began by unfolding a NURBS object that had been mapped to a Poser figure, producing a sewing pattern, or template. Then, by applying traditional sewing techniques such as darting, folding, and sizing, the two-dimensional pattern was able to become a three-dimensional object. The darts and sizing information were then incorporated into the template to re-inform the NURBS model, so it became a cyclical process of digital and hand-crafted techniques. The use of NURBS allowed for a highly detailed study of the digital model, which led to the creation of a full-scale physical model. The full-scale model was then created and put into use by several smokers to be tested. The results demonstrated the digital model's accuracy and successfully created habitual awareness by altering the inhabitant's sensorial experiences.

gia Clark - Caminhando (Trailing)

Community

One of the major facets to habitual smoking is the byproduct that is the 'smoking community'. People that often have no other social, ethnic, or moral ties, join together to take part in their habit. The community becomes a social atmosphere that bonds people who only communicate 'while having a smoke.' Without the smoking community many of the social bonds would be weaker or even nonexistent.


Transforming Habit

Faculty of Architecture and Urbanism, School of Architecture
UNIVERSIDAD DE CHILE
Santiago, Chile

Design and Modeling as Parts of an Integrated Approach

BY ANDRÉS CAVIERES, INSTRUCTOR

Usually the teaching of 3D modeling in computer graphics courses does not focus in an explicit manner on design problems. On the other hand, undergraduate architectural studios do not worry very much about 3D software resources and 3D modeling learning. Although digital studios under the "paperless" philosophy are based on intensive modeling, the existing gap between the learning process of architectural issues and the learning process of 3D modeling is not clearly stated. There are many inevitable links between design results and modeling techniques used for those purposes but, unfortunately, they are quite tacit and its consequences are often not explored in a systematic way.

In our school, some design studios have been very successful in introducing the representational capabilities of digital media, but the design process still tend to be very traditional, and it is not very open to include feedback from that instrumental dimension. This elective undergraduate computer graphics course focuses on this particular issue, exploring in a very specific and limited (not restricted) way the creative possibilities behind software operations, seeking to trigger architectural concepts that could be related with them.

During the semester we developed a series of exercises driven by some general themes which introduce students not only to the technical learning of software tools–instead they are intended to stimulate them to reach a critical approach to design thinking. In this manner we are trying to reinforce the exploration of formal and spatial relationships beyond the traditional methodology used by computer graphics courses.

Some themes that we have proposed were called: "Landscape Strategies", "Programmatic Explorations" and "Program, Structure, and Skin". Each of these themes was developed by students as design problems that had to be solved in first place through the use of a limited, but not restricted, set of tools. In this manner, "Landscape Strategies" basically looked for designing an urban or natural landscape from a series of interventions by means of boolean operations that modified a "terrain" solid model.

On the other hand, "Programmatic Explorations" search to foster the analytical potential that could be obtained through the systematic and selective handling of attributes. The main resources used were layers, colors, textures and lights, as well as symbols. Finally, "Program, Structure and Skin" was given as a case for studying the interdependencies that could be revealed during the design process among these three architectural categories, by means of the different possibilities offered by meshing tools.

We believe that the great versatility existing in the **form·Z** meshing tools is also due to the high degree of conceptual polyvalency suggested in the manner they work. In this sense, a particular combination of meshing tools could be useful to describe the tectonics of a building, i.e. its envelope as well as its structure within a modular system. However, the same modularity of the mesh, when treated differently, could serve to define more abstract relationships of the design, such as the functional and programmatic layout or other abstract patterns.

The following case (Felipe Rebolledo's work) is an example of this last theme. Our statement for the project considered some initial constraints relative to the main tools to be used. In this manner, students had to design a building using as leit motiv the meshing tools, from polygonal mesh to Bezier and Nurbs. In order to complete the building they could use previously known tools, such as extrusion, sweep, boolean operations, etc.

From the modeling of an initial mesh, which had to be defined as an enclosure skin (C-Mesh, Skin, Mesh or Nurbz mainly) students had to derive a structural and a spatial system. As the mesh implies a modular system, certain relationships among the skin, the structure, and generic spatial programs could be explored and studied. A special emphasis was done in registering the design/modeling process in order to capture some of these relationships.

CONCLUSIONS

We believe that a true stimulus to the learning process of 3D modeling in computer graphics courses has to be the commitment to the improvement of design quality. Indeed, as designers can only design what they are able to represent graphically, the students' will to improve their designs has driven their own acquisition of advanced modeling skills. With this experience we tried to solve, partially at least, the division existing between architectural design learning and 3D modeling learning. In this manner both kinds of learning feed back to each other, generating an openness for discovery of new architectural possibilities.

Faculty of Architecture and Urbanismo, School of Architecture
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Santiago, Chile

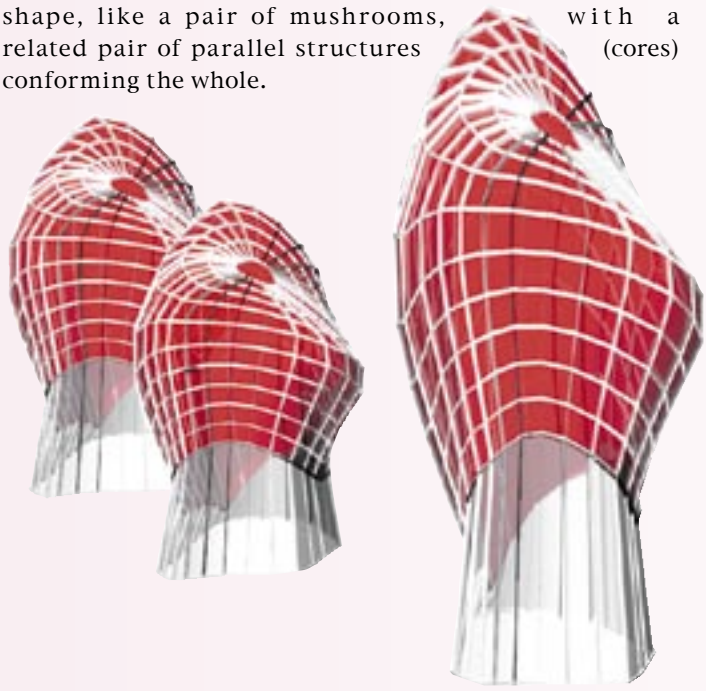
Program, Structure and Skin

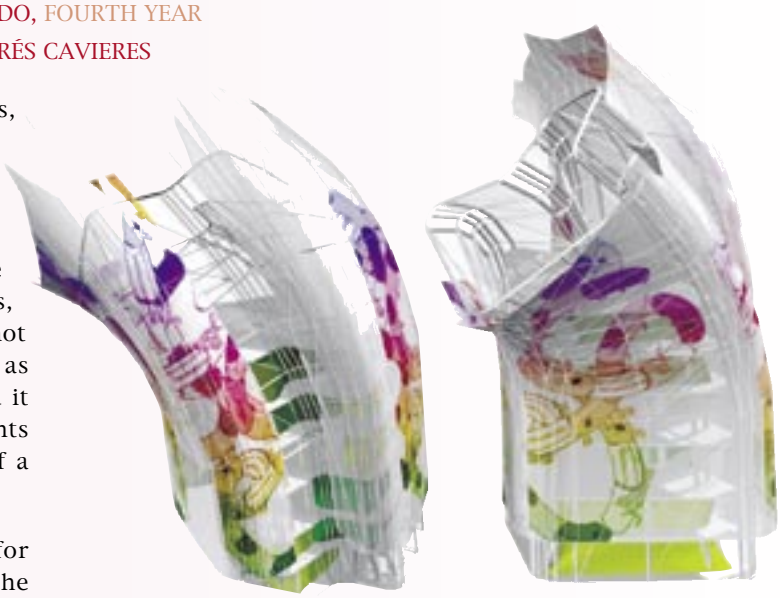
BY FELIPE REBOLLEDO, FOURTH YEAR
INSTRUCTOR: ANDRÉS CAVIERES

This is about data input, the informational process, and formal exploration through digital media. A modeled architecture conceived from millions of pixels. Nowadays, it is worth wondering about the influences of technology on the manners we have to conceive and make architecture. In order to imagine spaces and to materialize intentions and possibilities, we have to handle digital tools in an appropriate way: not simply as means for making digital models, but also as integral parts of the creative process. To understand it as an infinite exploratory instance, where the constraints of reality do not restrict the conceptual potentials of a project.

3D software is understood as a field of possibilities for dynamic action, where the actions are endless, by all the different combinations that we are able to do as individual users, multiplied by the extensive variety of different users.

The requirement was to design a building without a specific architectural program, using **form·Z**. Given the absence of a specific program, it was determined to start from the external form, using the meshing tools. This way I set my project in such a way that the main idea was to generate a vegetal shape, like a pair of mushrooms, with a related pair of parallel structures (cores) conforming the whole.

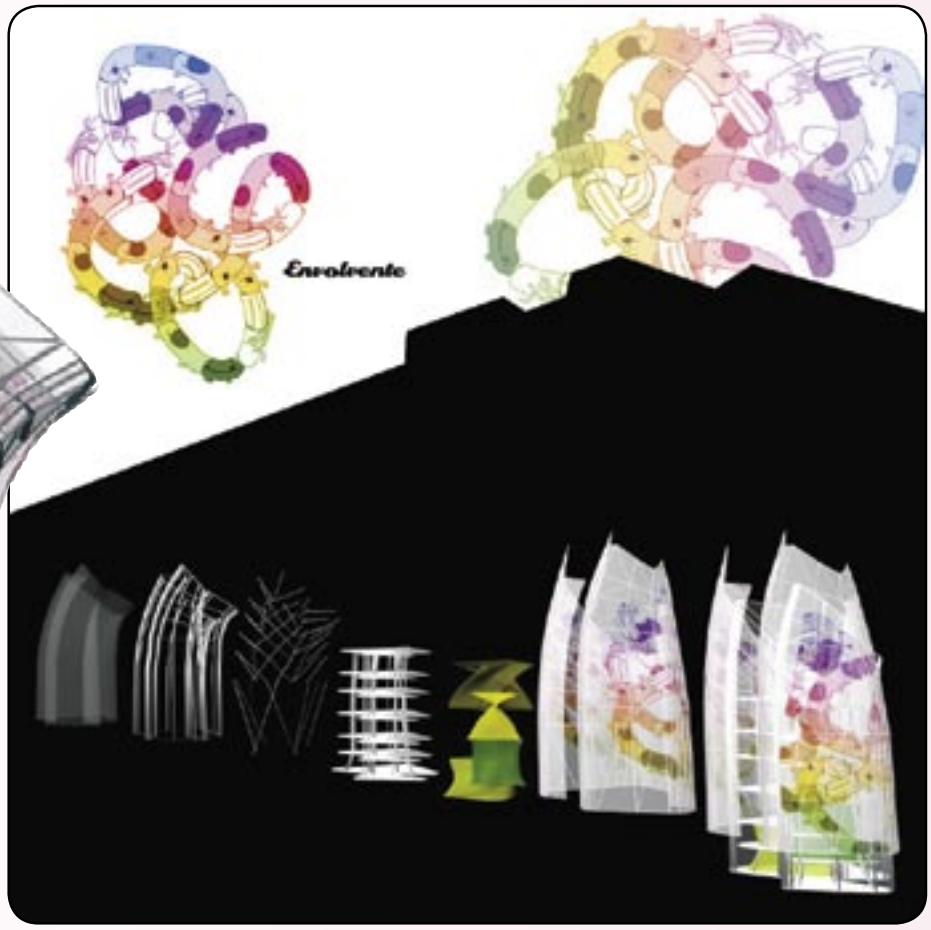




Exploratory models were developed using surface tools, in order to determine a suitable form, which would allow a dynamic relationship between both cores. Another important issue was the consideration of conforming the project as landmark in the surroundings. Through this tentative process a formal structure was obtained, which became the base for obtaining all the different components that conform the building:

- With the Mesh tool, it was possible to make and to organize a skin, as well as its inner structure, in the most efficient way possible.
- A parallel second opaque skin was then generated that differentiates both cores, which allowed a controlled entrance of light into the interior.
- In the absence of a specific program, this second skin was located inside both cores, linking in this manner more than a level, depending on the requirements of space.
- Finally color maps were applied to the surface of the second skin, to grant character and an aesthetic value to the building.

My main intention was to begin from a single formal structure and, after a number of small editions done with **form·Z**, to generate all the different elements that transform the building into an integrated system of similar patterns.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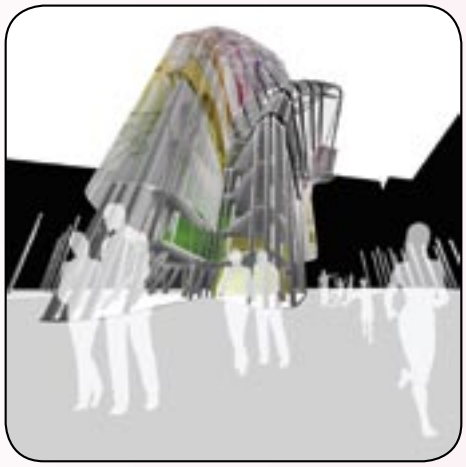
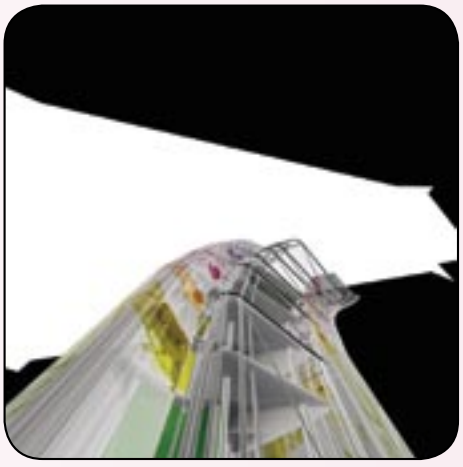
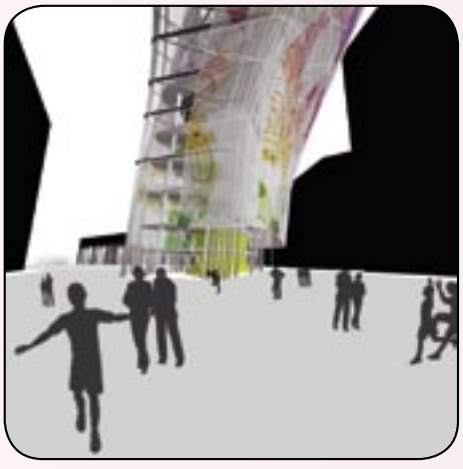






The Impact of the Computer on a High School Architectural Design Class

Art Faculty
THE DALTON SCHOOL
New York, New York

BY ROB MEREDITH, HIGH SCHOOL ART FACULTY

The architecture program at The Dalton School began 26 years ago, inspired by my own interest in sculpture and architecture, and with the encouragement of Dalton's administration. The architecture curriculum was added to an already rich program in the visual arts. In 1979 I started an introductory course at the high school level in architectural drawing and design. Today the Dalton program has evolved into three levels of architecture (beginning, advanced, and senior project) and includes computer modeling, using **form·Z**, as a primary way to explore the study of architectural design.

When I look back on the early, pre-computer, phases of this course, I realize that the focus of trying to foster creativity, self exploration, and problem solving were issues very similar to those in the class today. What have changed dramatically are the method of exploration and expression as well as some of the preparation it takes to ready students for the more technological approach to design. Since 1992, the Dalton students have been using computers and **form·Z** to produce much of their work and, while there is an important place for drawing, drafting, and physical model building, the computer allows beginning students to express their ideas in a more competent and flexible fashion. Students can conceptualize and comprehend their designs more readily when using a computer. They can enter their building and view it in perspective, or understand the interactions between interior and exterior spaces. These abilities help students visualize architecture as no other tool has before.

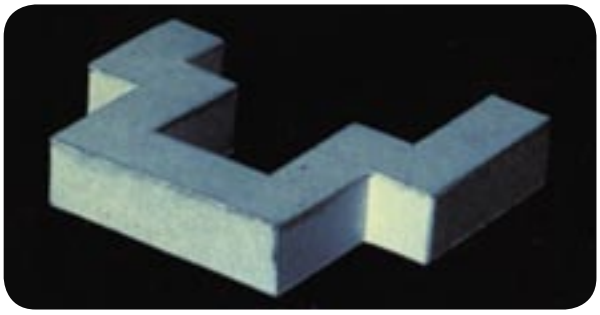


FIGURE 1:
ASTRID PERLBINDRER
MODULE AND MODULAR SYSTEM, 1983

To trace the impact the computer has had on my course, I only have to look at an introductory assignment I have offered to my beginning students for the past 26 seasons. In this project students are asked to invent a modular system by first designing a building block, the module, which can interconnect in multiple ways with other identical modules to create a range of final system configurations. Originally in the pre-computer days, I asked my students to construct this project by beginning with sketches, mechanical drawings and completing the project with 12 identical physical models in chipboard (figure 1). They would then assemble and demonstrate the systems at a final critique.

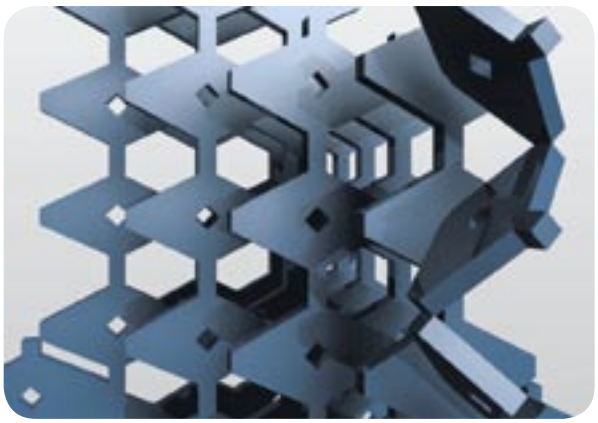


FIGURE 2: NICK SLAVIN,
MODULAR SYSTEM , 2003

While the project provided a valuable learning experience on many levels, the tedium of constructing 12 identical elements was sometimes trying. Additionally, students would not always understand the potential in their design until they had the opportunity to build with a few physical models. Today, I still offer this assignment, but now the beginning students construct their modules on the computer using **form·Z**. They can more fully experiment with the range of possibilities and while the minimum number they may use to construct a system is still 12; they often build complex constructions involving additional modules (figure 2). This transition from the traditional working methods of drawing, drafting and model making to a computer represents a tremendous shift in architectural education. Architecture programs across the country have struggled with this transformation in one form or another for the past two decades.

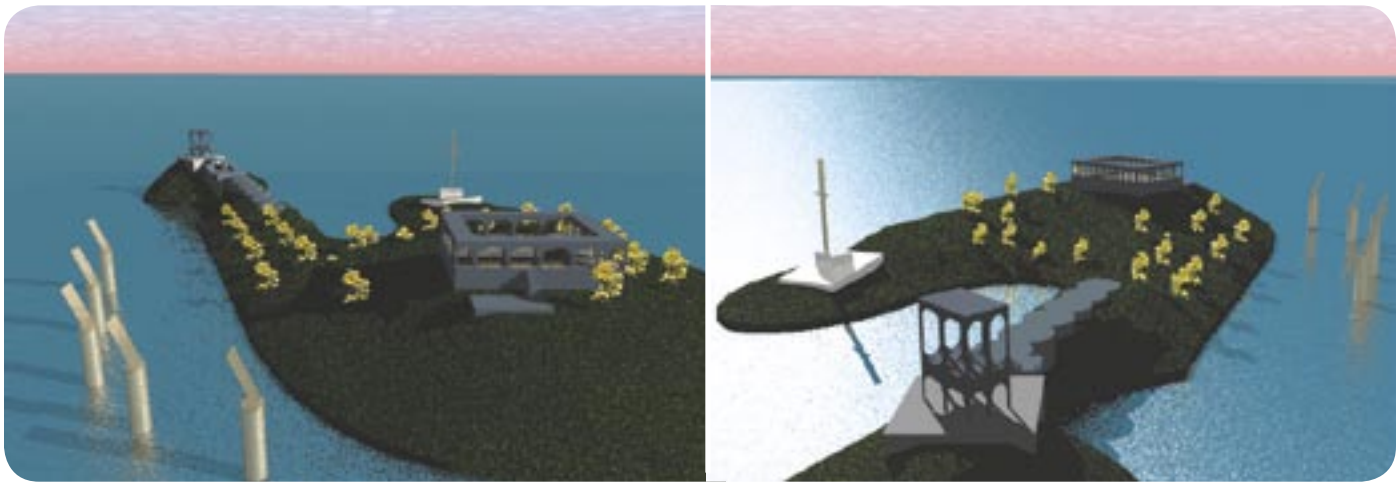
FIGURE 3: DAVIS BRODY, COMPUTER RENDERING OF ASTRID PERLBINDRER'S MODULAR SYSTEM, 1983

The early stages of computer modeling were in fact very crude by today's standards. In 1983, a Dalton parent, Lewis Davis of the firm Davis Brody, invited my students to visit his office in order to show them his new comprehensive computer facility, one of the most advanced at the time for its modeling capabilities. Two technicians maintained the system and were responsible for inputting information. They were pleased to demonstrate the software's power and potential by showing a current project, upon which they could assign any vantage point in the city to look at in a perfect perspective rendering. At that time we were amazed at the remarkable results. Students were also asked to bring some of their own modular systems to the Davis Brody office and over the course of a week, the technicians had modeled the student projects and made prints. Today these models (figure 3) look rather crude, monochromatic and pixilated in comparison to those created by my students today using **form·Z**.

Using the computer doesn't automatically make everything easier. It presents the teacher and student with new challenges. With **form·Z**, students have a substantial learning curve at the beginning of the course and it takes them a while to feel competent in their modeling skills. I find that those who have previous experience with technology adapt more quickly than those who do not. Frequently students are so interested in the potential for the realism **form·Z** can simulate, that they focus their energy on producing photorealistic results instead of concentrating on making good architecture. Another concern regarding this technology is the male to female ratio in my classroom. Are more boys attracted to this type of technology than girls? Before I began using the computer to teach this course, my classes where almost always balanced between girls and boys. Today that self-selecting ratio has shifted to a more boy dominant class. This year from my two beginning classes of 20 students I have 8 girls, the highest enrollment I have had in years. However, in my advanced section, in a class of 13 students, they are all young men. I constantly question whether the game playing technology so seductive to boys is in some way attracting them to 3D modeling in disproportional numbers to the girls. And if so, how do we attract girls and women to this technology?

One other effect the ubiquitous computer has brought to the study of high school architecture has to do with the extent of some of my assignments. I seem to be able to implement more conceptually demanding assignments. In recent years I have created a number of new projects exploring ideas I would not have tackled years ago. One example is when my students study the Japanese concept of Ma, the relationship between space and time. In the Ma assignment (figures 4 & 5), students must create three architectural components for a specific terrain. They must then interconnect them with some linking device whether it is a path, road, or waterway. One encounters the architectural components over a period of time, with a specific beginning, middle, and end. Space, and its connection to time, is encountered on many parallel layers. In this assignment, students explore terrain modeling and its relationship to architectural elements placed upon it, as well as the connection between the natural and the fabricated. All these possibilities grow from the facility of the computer as a tool for exploring.

It is a constant challenge to get my students to tackle complex ideas, pushing past initial solutions and flashy renderings. They must balance the substantive against the superficial. Hopefully the assignments demand students to dig below that visual surface so easily achieved with computers, while at the same time keeping the essential question of what makes good architecture in the forefront.



FIGURES 4 & 5: JON-MARC BALINT, MA ASSIGNMENT, 2004

Interior Design Program
DREXEL UNIVERSITY
Philadelphia, Pennsylvania

Developing Visual Skills for Perspective Viewing and Rendering

BY AMY WALTER-GODSHALL, INSTRUCTOR

In our Interior Design program at Drexel University, we introduce modeling with **form·Z** during our sophomore design foundation courses. We feel it is important to encourage students to use the 3D technology as a visualization tool to explore their designs. This article describes one of the projects created to technically advance a student's perspective viewing and rendering skills, while allowing the instructor to introduce topics that focus on developing the visual skills of a young designer.

AMY MODLIN

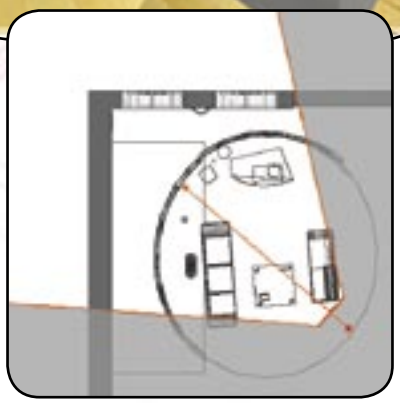
The project begins with the student searching for a photographic image of an Interior Design that they find inspiring in spatial volume and in material selections. The technical aspects of the project involve re-creating the selected design in a virtual 3D model with a matching perspective view and simulated materials.

It is through the technical development of this project that the instructor introduces the following visualization topics:

EXPLORING SCALE AND PROPORTION IN A PHOTOGRAPH:

The students quickly become concerned about the fact that they have few, if any, dimensioned drawings for constructing their selected interior design. However, this begins the topic for explaining how they can use their knowledge of scale and proportion to extract dimensional information from a photograph.

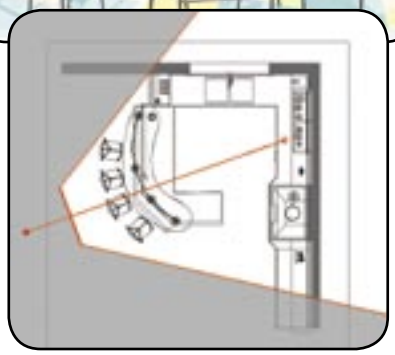
The first objects constructed with primitive shapes in the 3D model are interior elements that can be given estimated dimensions; for example: furniture, cabinetry, and modular systems. Then the placement of additional elements, including the surrounding walls, is determined through proportional relationships to those first scaled objects.



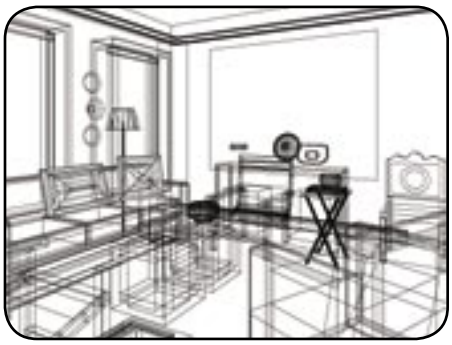
COMPOSING AN EXPERIENTIAL PERSPECTIVE VIEW:

The next topic involves analyzing the perspective lines of the Interior's photograph. Basic composition techniques, used by photographers, are discussed: focus (or center) of view, edges (or frame) of the view, and view angle (or camera lens).

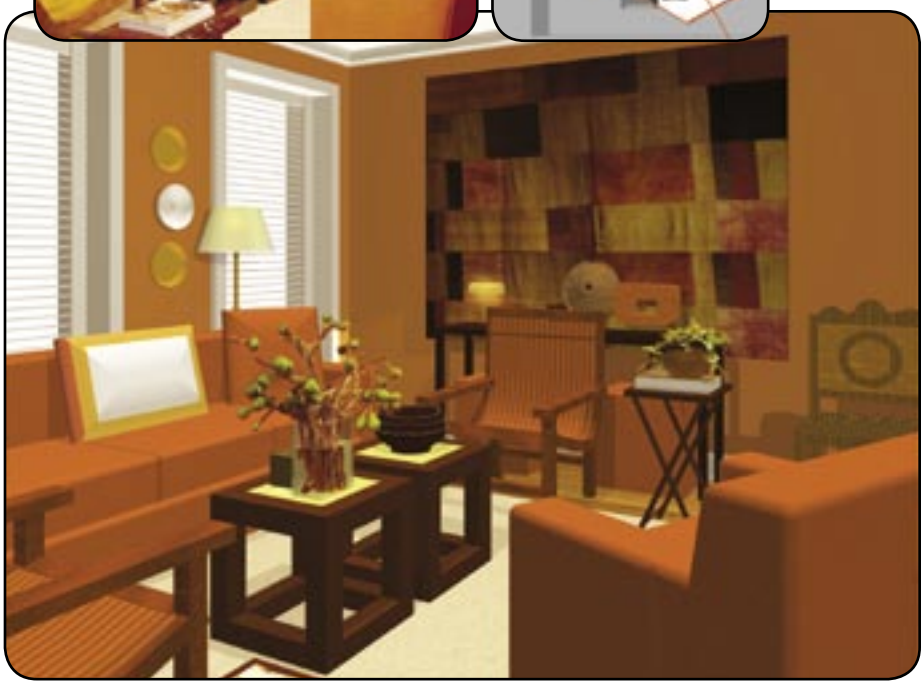
Technically, the students are then re-introduced to **form·Z**'s perspective making tools. The students quickly understand the "Eye Point" and "Center of Interest" settings since most have had experience with a 35mm lens camera. But the idea of choosing the appropriate camera lens or "View Angle" evokes a more advanced discussion. An angle that is too small (less than 50 degrees) creates a narrow view that minimizes depth differences. While an angle that is too large (more that 80 degrees) creates a wide view that exaggerates visual depth.



KATHRYN HUNCHAR



It then becomes apparent that, to generate perspectives that feel experiential, similar to a photograph, one must first set up the view angle accordingly. The range of view angles that work well for this project are between 50 to 80 degrees. This range of angles is directly related to the wide-angle lenses typically used by photographers to document building interiors.



KATRINA DANIELS

ENHANCING VISUAL DEPTH WITH SHADOWS:

The topic of light and shadow in a computer model can be quite extensive; therefore we start by introducing the creation of a single "point" light source to provide general illumination, but to more specifically generate shadows.

Graphically, shadows add visual depth to a perspective view by relating the elements to their surrounding surfaces, for example: a chair's placement on the floor. It sounds simple but, without shadows, many computer rendered perspectives will appear flattened due to lack of depth perception.

In addition, some students explore the use of additional light sources to accent interior elements. This enables them to lighten areas in their view or use the "glow" feature to simulate the effects of a light bulb or candle.

ERIKA MEYER

THERESA HORENBURGER

KELLY SHAY

VANESSA PRESTON

ANNA DRAGUNAS

RACHEL THOMAS

SIMULATING INTERIOR MATERIALS:

Due to the ease of **form·Z**'s Surface Styles palette, the students are quickly applying color and materials to surfaces. This becomes challenging in our foundation design courses because the student's technical knowledge of materials is not as advanced as their virtual skills. Therefore the exercise of replicating an existing image encourages the students to analyze real-life application of materials and explore options beyond the "default" settings.

Techniques are also explored for using applied surface styles to simulate depth on a flat surface. This involves advanced exploration into the various options available for changing color, transparency, reflection and bump.

In addition to rendering in **form·Z**, the students use Adobe Photoshop to enhance their final renderings. They explore copying elements, such as plants, from the original interior image into the virtual rendered perspective view. This enables students to soften their computer renderings with some realistic elements.

JENNIFER BARRY

AMANDA JAMES

NATHAN GALUI

MATTHEW STETSON

Production Design Department
AMERICAN FILM INSTITUTE
Los Angeles, California

Ancient Principles Inform 3D Production Design

BY RICHARD REYNOLDS, SENIOR LECTURER, PRINCIPAL INVESTIGATOR

form·Z FOR FILM

The American Film Institute Conservatory is an accredited 2-year MFA program granting a degree in Film Production Design, as well as the areas of producing, directing, writing, editing and cinematography.

AFI production design fellows are actively involved in making student films throughout their time at AFI. In addition to their other academic studies, in second year they receive a one year course in 3D computer design for film using **form·Z**. This course is a 3D computer design practicum for film production design purposes, using classical architecture to illustrate the principles of design. Additional emphasis is placed on specific film production design conventions and techniques.

HOLLYWOOD TRAINS ON form·Z

We utilize **form·Z** for 3D modeling of our film sets, rendering for conceptual presentation and keyframe illustration, 2D drafting for set construction documents, and animation both to explore a set spatially and to present the set as a specific film camera will see it to the director and producer.

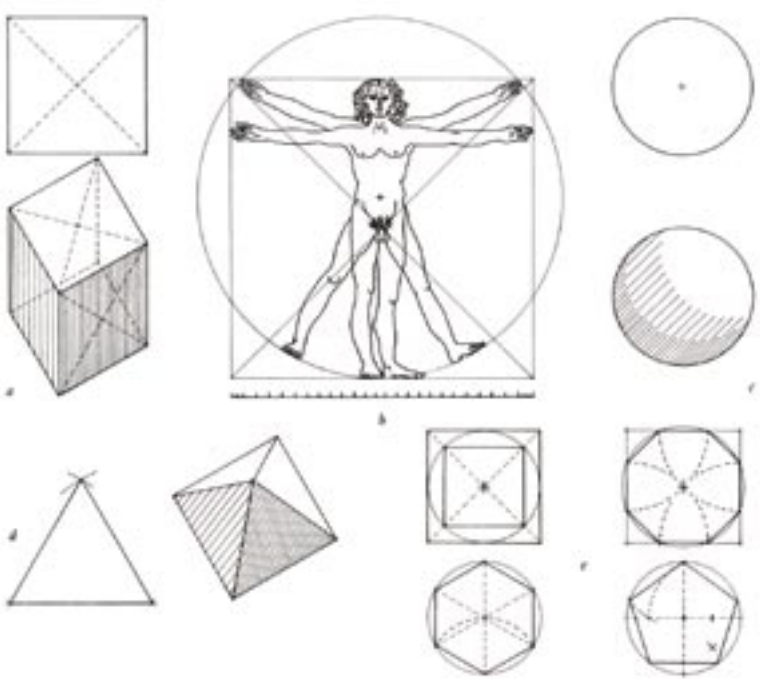
As a laboratory exercise text, we use Lachmi Khemlani's excellent book "**form·Z** 4 - 3D modeling, rendering & animation". Her book provides in-depth explanations and step-by-step instructions for the students to follow, at their own pace, for their lab time.

During the hands-on class time we begin with a 3-wall "sit-com" set and learn floorplan layout techniques, extrusion to height, and examine the Boolean tools in order to place accurate windows and doors. The sweep tool creates cornice, chair, base, door and window moldings, while the 2D derivative tool forms accurate window mullions.

This 3-wall set is used to render hidden line projections and descriptive perspective views for simple drafted documents. We further analyze in 2D, human scale, proportion, film conventions of sheet layout, dimensioning, labeling, and title block.

PROPORTION AND A WORLD WITHIN A WORLD

Our next exercise involves the investigation of ancient classical Greek proportion and proportional systems. Drawing from Robert Adams' "Classical Architecture", (1991), we experiment in 2D with rectangular proportions, both arithmetic and geometric for the purpose of design layout in plan and elevation.



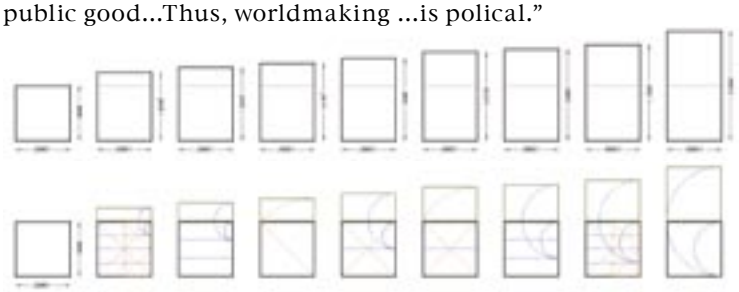
Proportion is crucial to design, and knowledge of how architecture has used proportional systems in the past can ground a designer in fertile territory from which to make creative and intelligent decisions.

F.D.K. Ching states in "Form, Space, and Order", (1996), "Mathematical systems of proportion originate from the Pythagorean concept of 'all is number' and the belief that certain numerical relationships manifest the harmonic structure of the universe."

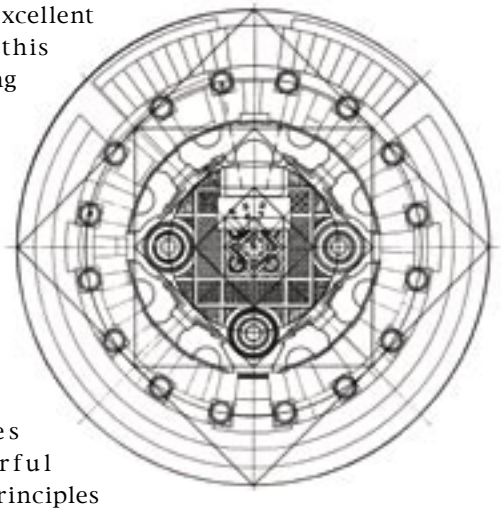
Today this mathematical connection underlying conceptual design also underlies the functioning of the computer as tool, and software as instrument, to manifest computer design work.

A. Tzonis and L. Lefaivre in "Classical Architecture", (1988), posit that "Every classical work is...cut out from the rest of the universe by virtue of its special order. To fashion this work is to make a world within the world.

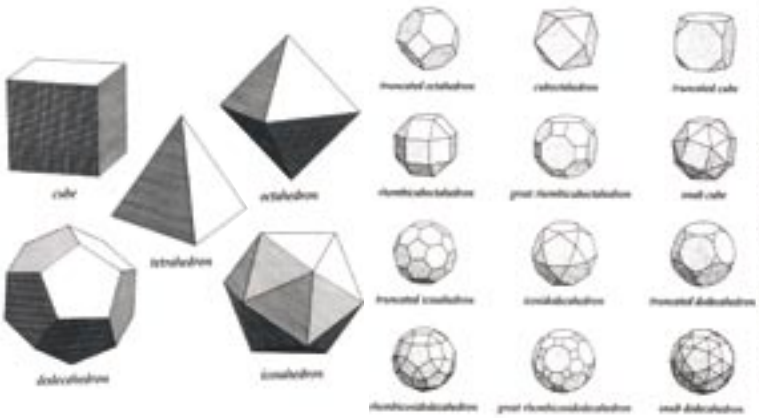
"The purpose of this world-making...is to instruct and persuade... The work should affect the minds of the audience for the sake of public good...Thus, worldmaking ...is polical."



We begin with simple arithmetic proportions based on the circle and the square, and move to the complex proportions of root-two, root-three, root-five rectangles, along with the mysterious Golden Section (phi Ø), Golden Rectangle and the Fibonacci sequence. We draw and find the relationships in the intensely geometric Ad Quadratum, Ad Triangulum, and the Sacred Cut. Regulating Lines that are parallel or perpendicular are introduced as a means of determining whether two rectangles have similar proportions. Using **form·Z** in 2D is an excellent way to both cover this material in an exciting fashion as well as gain experience with the drafting tools and the incredible accuracy in drawing simple and complex constructions.



Taking exercises from the wonderful M.W. Jones book "Principles of Roman Architecture", (2000), combined with D. Sutton's concise "Platonic and Archimedean Solids", (2002), we travel back in time to uncover the ancient, underlying foundation of the Western sense of proportion and balanced design.



All of this takes place while learning to use the 2D drawing tools, underlays, importing and viewing images (scans), drawing with object snaps and labeling with the text and dimension tools.

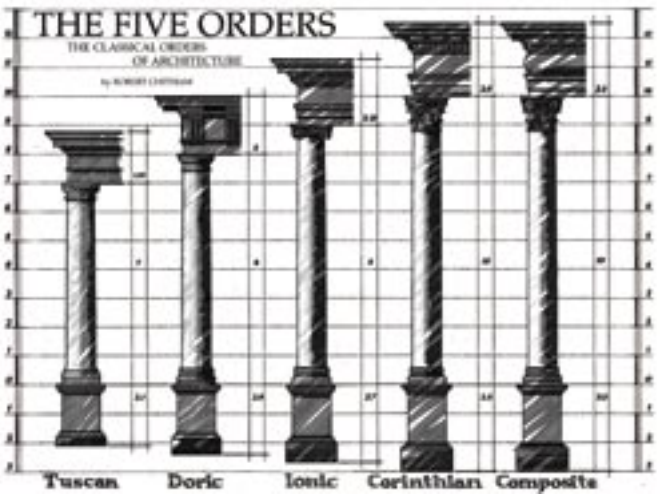
VITRUVIUS AND THE ORDERS

The 5 Orders of Architecture are the next destination in our study of proportion. F.D.K. Ching (ibid.) summarizes, "To the Greeks and Romans of classical antiquity, the Orders represented in their proportioning of elements the perfect expression of beauty and harmony. The basic unit of dimension was the diameter of the column. From this module were derived the dimensions of the shaft, the capital, as well as the pedestal below and the entablature above, down to the smallest detail. Intercolumniation–the system of spacing between columns–was also based on the diameter of the column."

We discuss Vitruvius, who in the time of Augustus, wrote the first treatise on the Orders, "Ten Books on Architecture", and the great renaissance theorist-designers who, in writing their own tracts on architecture, emulated his landmark work, Alberti (c. 1450), Serlio (1540 – the first published drawing and comparison of the Orders), Vignola (1563), Palladio (1570), Scamozzi (1615), Perrault (1676).

This leads us to use the exquisitely drawn R. Chitham book, "The Classical Orders of Architecture", (1985) to model a Doric column complete with pedestal and entablature. This exercise in **form·Z** allows us to examine the "tripartite" (rule of three): proportion regarding an architectural element (as opposed to space), lines of symmetry and axis, and human scale. We learn to use the revolve tool, of course, in creating the column and moldings.

Hidden line renders capture the column in projection and perspective views which we transfer into 2D drafted form to review the drafting procedure.



NATURE AND GEOMETRY

Our next exercise is to follow in the footsteps of the founding designer of the Baroque, Borromini, using Anthony Blunt as our guide. His book "Borromini", (1979), gives us this wonderful summary of the Renaissance design process. "There is, however, a third authority to which Borromini appeals in addition to Michelangelo and the Ancients, namely Nature.

"With Alberti the theory that architecture imitates nature was combined with the Aristotelian idea that nature is based on laws,...Often the harmony underlying nature is associated with the idea of mathematics, either with the Platonic idea that nature is composed of the five regular solids, or with the Pythagorean belief in the eternal value of numerical relations. For Palladio the true proportions of a building were based on certain simple arithmetical relations derived from musical harmony. For Alberti and others the connection was rather with geometry..."

"...a fundamental feature in Borromini's method of working was] the fact that he evolved even his most complex and apparently whimsical designs by a series of geometrical manipulation. It has often been pointed out that the plans of S. Carlo alle Quattro Fontane and S. Ivo are based on a series of triangles and circles, but it has not always been sufficiently emphasized that they were actually created out of these geometrical figures."

With this in mind we work on top of Borromini's sectional drawing of the molding of door to cloister at S. Carlo alle Quattro Fontane, Rome, 1665. A. Blunt relates, "A section of the cornice given in an early eighteenth-century engraving shows the system on which the mouldings were based. The whole cornice is enclosed within a square ABCD. The side AD is divided into halves and quarters at F and E. These give J and G at the points a quarter and half way along the diagonal AC, which mark the main breaks in the moulding. The lower half of the moulding depends on the proportions of 1:2 and 1:3. For instance, the radius of the arc JP is one sixth the side of the square, and the same radius is used for the arcs PO and NM. A circle of double this radius, i.e. one third of the side of the square, runs through the points J, O, N, L. The lengths of LS, SM and SQ are all equal, and the arc LQ has a radius of one twelfth of the side of the square. Finally, all the crucial points in the moulding – G, J, L, Q and R – lie on the diagonal AC."

This complex molding not only shows us the sophisticated use of geometry as a practical aid to design. It also makes for a delightfully elegant use of the vector and arc tools to reproduce in one flowing expression the layout of an important piece of architecture. We perform this in the modeling environment to create a smooth source shape to use with the sweep tool to create a 3D door molding.

BRAMANTE INNOVATES

Our next project is to return to the High Renaissance in the company of Donato Bramante. In John Summerson's "The Classical Language of Architecture", (1993), he relates, "It was he, more than anyone else, who re-established the grammar of ancient Rome in buildings of pre-emminent consequence...Everybody recognized his authority." Serlio wrote that he was the man who revived the buried architecture of antiquity; and Serlio paid Bramante an even greater tribute when he included some of his works in the part of his book ostensibly devoted entirely to ancient Rome. For Serlio, Bramante was the exact equivalent of the antique.

"This Tempietto is a perfect piece of architectural prose–a statement, clear as a bell." The Tempietto is the progenitor of all 'capitol' domes throughout the Western world including those of church architecture at St. Peter's, Rome, St. Paul's, London and the Pantheon, Paris.

As such a seminal work, and because of its limited scale and precise proportion and detailing, the Tempietto makes an excellent 3D modeling project. We employ our previously modeled Doric column in a full building context and utilize the revolve tool repeatedly to create the elements of the Tempietto which are rigorously aligned to its central vertical axis in keeping with its primary function as a martyrium.

ANNIE CAMPOS

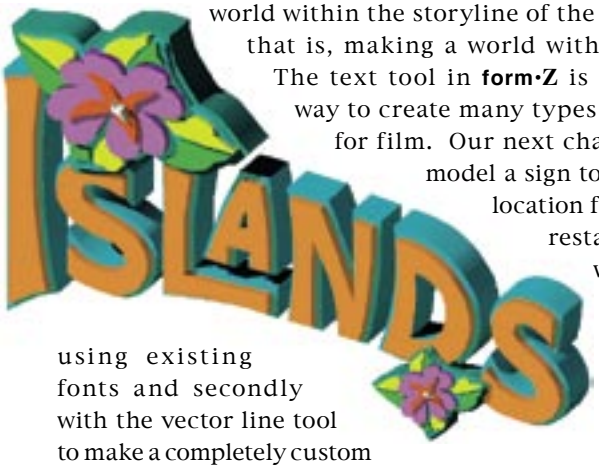
We proceed with the 3D model and use it for authentic texture mapping, lighting and studies of composition within the camera's frame, as well as its drafted presentation.

The Tempietto and its courtyard is a centrally designed building that is radially symmetrical and this introduces the concept of radial layout in plan, as opposed to the more common rectilinear organization. Students must divide the plan in an angular manner to copy rotate elements into correct position.

As an advanced exercise, students are encouraged to finish Bramante's original design for the surrounding courtyard of the Tempietto which was never completed. We will return to our model of the Tempietto later on and use it again for animation studies.

SIGNS AND GRAPHICS

Creating signs and graphic logos is an integral part of film production design for the purpose of creating a believable world within the storyline of the screenplay, that is, making a world within a world. The text tool in **form·Z** is a powerful way to create many types of 3D signs for film. Our next challenge is to model a sign to be used on location for a specific restaurant, first with the text tool using existing fonts and secondly with the vector line tool to make a completely custom letter style. Lighting the sign, illuminating it as neon and texture mapping follow.

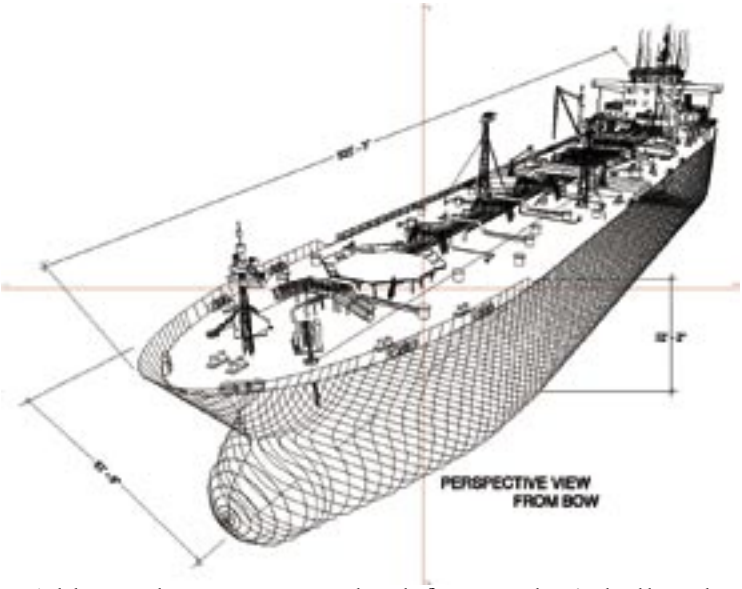


BOROMINI GEOMETRY AND LOFTING

We return to Borromini's work on St. Ivo della Sapienza, Rome, 1643, for an examination of his complex geometrical layout for the plan of this landmark building. A. Blunt (ibid.) describes it, "The general design is of extreme ingenuity, and in it Borromini brought to full maturity the ideas with which he had been experimenting..."

The plan is based on two equilateral triangles which interpenetrate to form a six-sided star on the outer periphery and a regular hexagon as the central space.

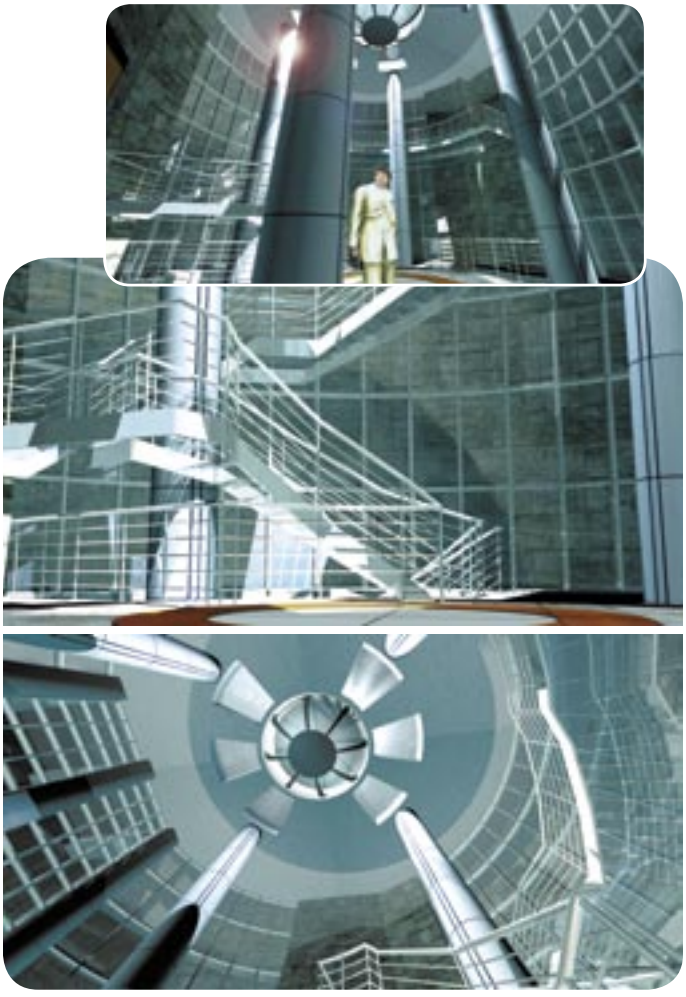
We construct this plan outline in 2D first, to rapidly lay out the underlying geometry and then, the plan. Distilling the non-repeating axial elements and centerpoints we transfer it to the modeling window where we will create a smooth compound curve with which to extrude the walls, sweep the entablature and loft the dome of S. Ivo. Texture mapping an image of the inner dome to the lofting gives us a good conceptualization of the complex space.



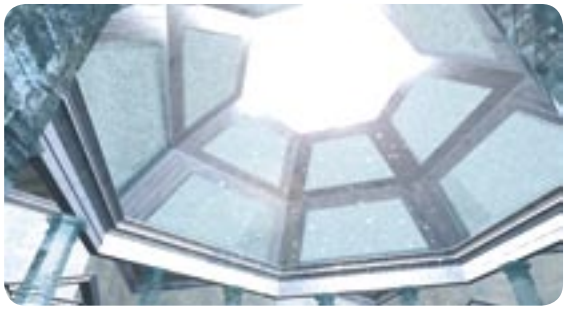
Additional exercises involve lofting a ship's hull and examining the integrity and "fairness" of the surface.

THE FINAL FRAME

The last part of the second semester is devoted to the fellow's Final Project, where they select a film script and create an original design for one or more sets. Finished renderings and animations are the end result, presented to the entire Institute at end of term, and for use in their portfolios.

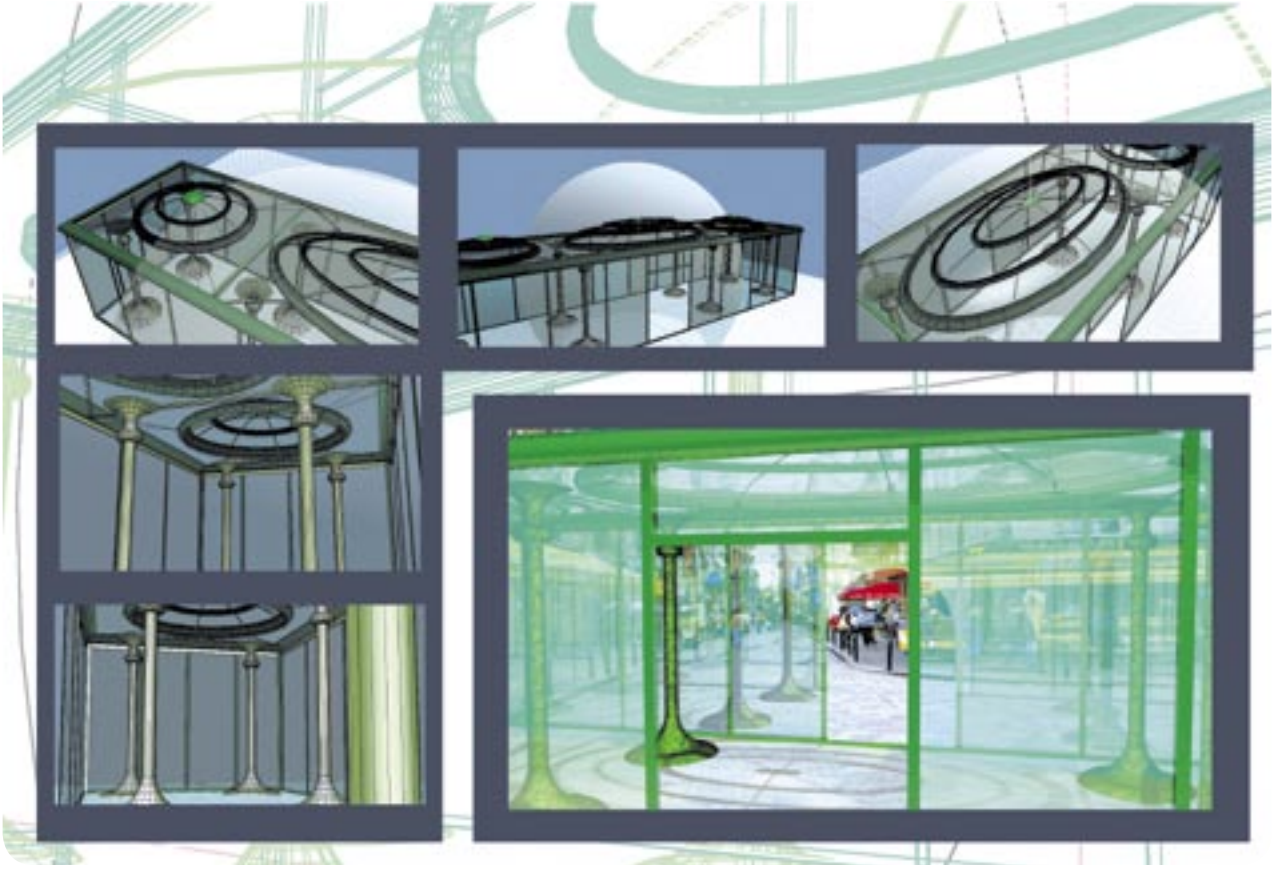


ANNIE CAMPOS
Production Design Concept for the film "Gattica"



MIA CHO
Production Design Concept for "The Wizard of Oz-3000"

MEGAN HUTCHINSON
Production Design Concept for "Labyrinth"



BRANDI HUGO
Production Design Concept for "The Tenant"

A Fertile Ground for Education

Product Design Department
TAMA ART UNIVERSITY
Tokyo, Japan

BY JACK LEAVER, VISITING PROFESSOR

Quick visualization tool is a requirement of today's competitive environment

FIGURE 1
"Gears"

TAKANORI OHSHIMA

FIGURE 2
"Gear Assembly"

Typically, entering Tama Art University students are thoroughly screened and the entry ratio to applicants in Product Design is very low. This usually translates into highly motivated students with a high level of graphic skills. Some have spent an extra one or two years preparing to just enter. The reason for the competitive entry process is that the department is traditionally rated among the leaders in Product Design education in Japan. Graduating students typically take jobs with major design firms here. Therefore the need for quick visualization tools is a requirement of today's competitive environment. As one can imagine these students provide a fertile ground for education.

The overview of the computer graphics curriculum consists of two courses designed to give a basis of computer graphic literacy, beginning in the first year and continuing through the second year. The first year is primarily geared toward two-dimensional graphics, giving the students basic presentation skills, while the second focuses on three-dimensional graphics, with occasional experiments in animation. Both of these classes are intended to offer support to the design studio and at times projects from the studio are used in either of these classes. This arrangement presents some difficulties in the timing of the class projects. Because the graphics in the computer class are often undertaken after the main design decisions have already been made, computer graphics are used primarily as presentation tools. Also, the initial development of the students' computer skills impedes these graphic tools from being used immediately in the design visualization process, but typically by mid year they are ready to tackle some more complex projects.

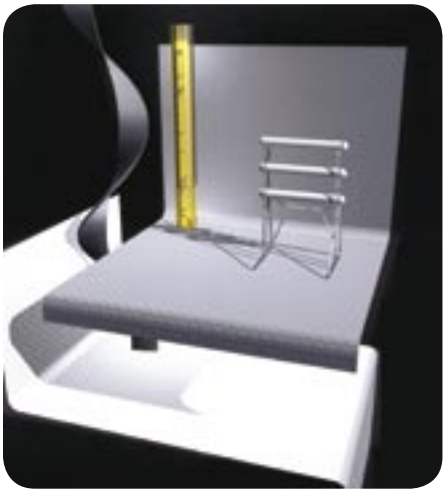
Since 2002, one Macintosh is available per student, for a class size of about 35 students. The class meets an hour and a half once a week for 27 classes. The multiple language feature of **form·Z** has really helped our students. Without a Japanese version it would have been a lot more difficult to teach this class.

The 3D course is an aid in the visualization of the three-dimensional creation of designer's products. The study of geometrical properties of objects, relationships of components, and the potential for redesign with an additional focus on materiality and image composition are vital activities undertaken in this class. The creative use of the software in executing the construction of various difficult models is a challenge of this class that seems to aid the students in their understanding of the objects that they are designing and the potential processes that will be used to make these designs. By using **form·Z**, an accurate rendition of the shapes and materiality of most designs is possible.

It is with this in mind that our initial exercises begin with the basics of modeling as shape creation. We then explore the relationship of these shapes with the addition of transformation functions and the basic tools of almost any three-dimensional graphics system are covered. The transformation tools are used not only for positioning but also for the redesign and design exploration aspects that they embody.

This approach has been undertaken with the use of various themes. Illustrated here is one involving gears. The images characterize the development of this project from the initial creation to a more involved assembly with the addition of various **form·Z** tools (Figures 1 & 2).

The sweep tool has been explored through the use of a chair design project that has, as one of its requirements, the use of steel rods for the structure. The one that is illustrated here is coupled with an adventure into the use of other tools and material investigation (3).



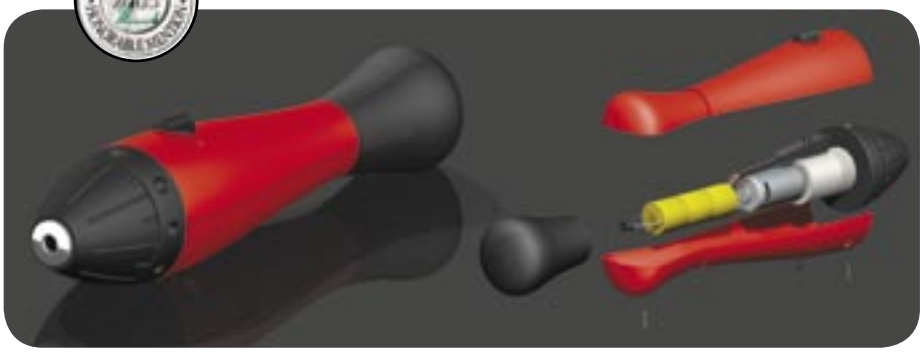
3. KENTARO HOSHIGA-"CHAIR"

A second phase of this class falls into a category of surfaces and shapes that deal with curvature and in **form·Z** are defined in terms of meshes and nurbs, etc. This portion of the class is vital for our students, as many of their designed forms are not linear. These projects are represented in the utensils project. This exercise provides a real challenge and opens a door to the exploration of more natural forms (4).

At about this time in our curriculum, a project that involves a relationship to human hands is usually conducted. Over the years these designs have consisted of hand tools, door handles, and sink designs (5, 6, 7).

The door handle projects had a particular level of difficulty. Modeling the hand required free forms in some cases, which provided a basis for the person whose project is illustrated to develop the confidence to challenge the modeling of a tennis shoe. This turned out to be the winner of last year's Industrial Design award (8).

HONORABLE MENTION IN PRODUCT AND INDUSTRIAL DESIGN
ALSO SEE PAGE #11.



5. YASUHIDE YOKOI-"HAND DRILL"

7. SHO SUGIE-"FAUCET"

6. NAMI NAKASAKI-"DOOR HANDLE"

The tennis shoe project was a means to advance the modeling experience of the students. The second project, shown here, was done quickly. I have included it, as an interesting expression of materials. With more careful modeling it would have been an exceptional project (9).

4. YO MAEKAWA -"SPOON, FORK, KNIFE"

8. NAMI NAKASAKI-"TENNIS SHOE"

9. MINEHA KO-"TENNIS SHOE"

In addition, other projects are constructed that deal with various studio designs during this phase of the semester. To close the year a final project is assigned, which the students select by themselves. Sometimes this is an existing product that they want to model or it is a completely new design that they are interested in executing. The existing products often fall into the category of electrical products, cameras, or various other devices, such as those shown below (10,11).

10. HAJIMU IWASAKI-"CELLULAR PHONE"

11. TATSURO HATTORI-"NIKON"

AWARD OF DISTINCTION IN PRODUCT AND INDUSTRIAL DESIGN
ALSO SEE PAGE #10.

12. GENKI HARADA-"MOTOR BIKE"

The design projects have included motorcycles, motorbikes, helmets, etc. The projects enclosed represent the existing product lines. This year's Product Design Awards winner designed a motorbike that was an original conception (12). The runner up (Honorable Mention) was a hand tool project he designed during the semester (13).

Concluding, I would like to thank all the people at **form·Z** for the opportunity our school has to participate in the Joint Study Program. It has provided our students with the use of professional three dimensional design oriented software, which allows them to visualize their ideas and dreams.

How Do You Teach 3D Imaging to Beginners in a Hurry

Technological Studies Department
BEMIDJI STATE UNIVERSITY
Bemidji, Minnesota

BY BARBARA R. HANUS, PROFESSOR

Bemidji State University has been exploring many different curriculum strategies to streamline the learning curve for our Design Technology students involved in Exhibit Design, 3D Animation and Graphic Design for Packaging. Our students are very creative and want to know everything related to 3D very quickly so they can see on the computer what is inside their heads. **form·Z** is the 3D software we are using to allow the students to create quality production in a short amount of time.

Our 3D Computer Imaging I course requires 3 major productions in 15 weeks with each assignment due at equal intervals throughout the semester. Each completed assignment must include:

1. Hand sketches of orthographic dimensioned views created during the ideation process.
2. Photographic references of related objects and materials from magazines, books, or the internet that could be used as references during production.
3. A production log that recorded the time involved during each step of production.

ASSIGNMENT 1: ANDREA KROLL
FALL 2005

4. High resolution renderings in a promotional/functional layout and a "photo album page" showing the structure of the 3D object or environment.
5. A specific type of advertising or informational animation of the 3D object or environment.
6. A written summary of how each component/object was created.

Because of the student's sketches and references, the student has a clearer understanding of what they want to create in **form·Z** before they begin and the instructor has a clearer "picture" of what the student wants to produce which leads to more productive dialogs when answering questions related to production. The production log allows the student to gain a better understanding of how their production time is being used, to analyze how they could improve their productivity and better plan a more effect production schedule for future 3D imaging assignments. The written summary can be used by the student as a reference for similar 3D production in case they cannot remember how they produced the first production.

The first assignment, which is due in the 6th week of the semester, is to produce 3 small objects that can be found in their dorm room or apartment using only simple object construction. In addition to the basic mesh construction methods, the instruction also includes simple lighting, basic surface/material construction and mapping, decals, and **RenderZone** full-buffer rendering controls. The basics of camera animation are also covered. The objective of the assignment is to allow the student experience in working in the 3D views and to gain an understanding of basic steps in production and their control standards (See assignment 1 examples).

ASSIGNMENT 1: PAUL FLEISCHMAN
FALL 2005

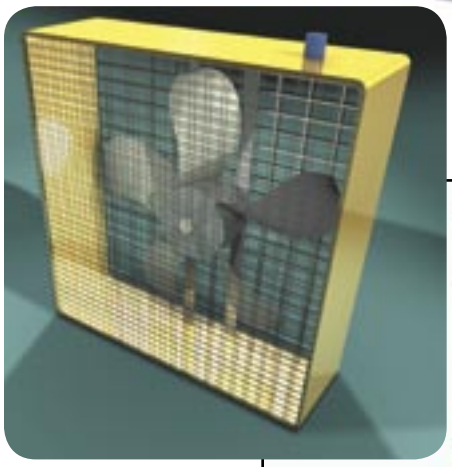
ASSIGNMENT 1: TIFFANY MCCRACKEN
FALL 2005

The second assignment requires the students to select an object that has internal working parts or a character with multiple sectional parts and produce it for print and animation.

Mesh construction instruction for the assignment includes advanced revolutions construction: helixes, sweeps and skinning; metaforms; advanced derivative objects; trimming and stitching; attachments

ASSIGNMENT 2: PAT LEOPOLD
FALL 2005

ASSIGNMENT 2: ANDREA KROLL
FALL 2005



ASSIGNMENT 2:
TIFFANY MCCRACKEN
FALL 2005

ASSIGNMENT 2: PAUL FLEISCHMAN
FALL 2005

ASSIGNMENT 2: TOM PISKOR
FALL 2005

and insertions; rotation, sizing and mirroring objects and meshes/nurbs/patches. In each 2 hour mesh instruction session the students are creating simple objects using the combination of tools. Assignment 2 instruction also covers control and customizing of materials and decals. Advanced instruction in lighting control and advanced animation techniques are demonstrated to create transitions, building the object from the individual parts in the final animation (see assignment 2 examples).

In the third and final assignment, students work in teams of 2 or 3 to create a public environment for a real or fictitious company/organization in which to greet, interact and/or possibly sell to their clients/customers. Structure of the environment must be modeled by team. Interior objects can be existing objects they modeled in assignment 1 or 2. Students are also allowed to use existing wire frames available as free downloads on the internet for interior objects which are placed in a library for distribution/placement in the structure. The environment must have a coordinated décor that reflects the company/organization's marketing strategy. Suggested environment could be, but not limited to, a lobby of an office or company building; tradeshow exhibit; retail store space or a museum interior exhibition area. The instruction for the assignment includes stairs; insertions; deletions; attachments; symbols and instances; arraying and alignment; importing file formats and the related controls; advanced lighting controls for environments including Radiosity controls and the controls for rendering Quicktime VR (see past Joint Study Reports for environment examples).

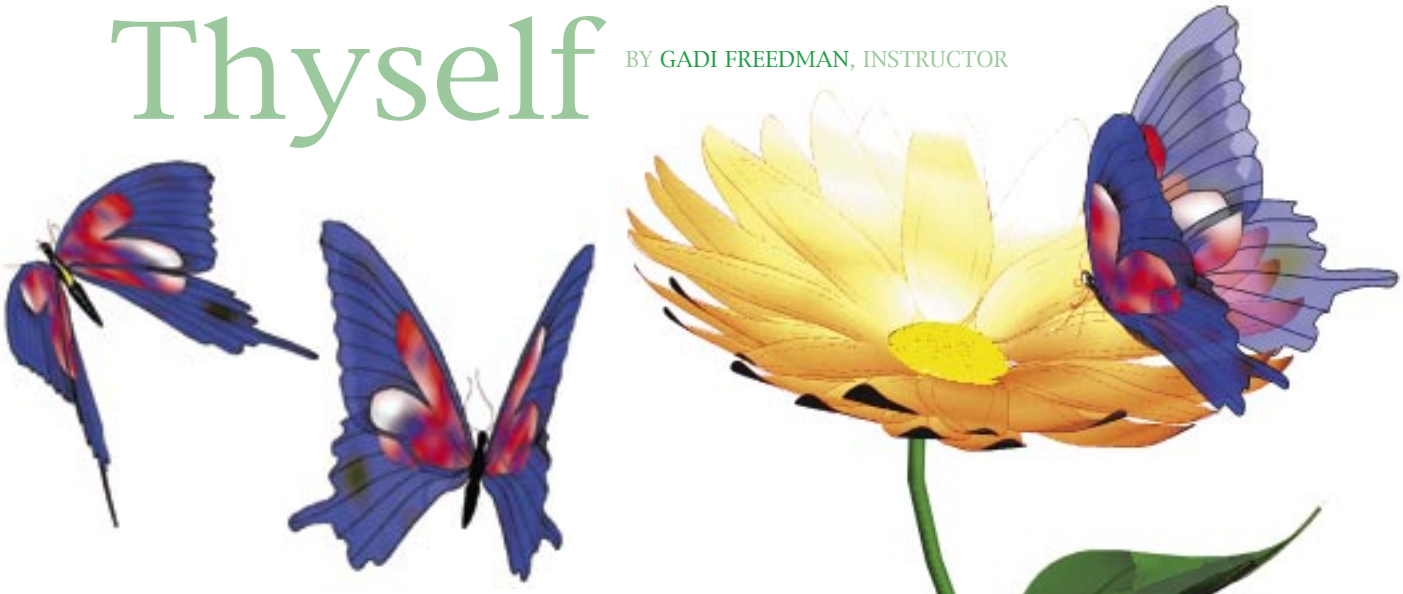
On average, each production involves about 25 to 35 hours outside of class "homework" to produce the assignments shown. We stress high quality lighting, surface materials, and rendering. Students are in the "computer lab" on average 12-16 hours a week including 6 hours a week class time. After 5 years of experimenting with the instructional path and the assignments, we feel that the student outcomes are finally coming closer to where we would like them to be.

If anyone else would like to share how they are structuring their beginning 3D classes, I would be happy to start a dialog and share whatever I have. I know how hard it is to keep up with the technology and work on curriculum at the same time. Just contact me at *bhanus@bemidjistate.edu*. I am looking forward to hearing from you.

Department of Industrial Design
HOLON ACADEMIC INSTITUTE OF TECHNOLOGY
Holon, Israel

Know Thyself

BY GADI FREEDMAN, INSTRUCTOR



ALBERTINE BLASS
Butterfly

ABOUT THE CONNECTION BETWEEN DESIGNER, DESIGN, AND DESIGN TOOLS

Have you ever looked at something you designed and felt that it was stuck? I know that I have.

Perhaps if we take a good look back at ourselves at the time, we would see that we, too, were stuck and uninspired.

When a design is created, the design and designer are one and the same. We might say the design is, in a way, a mirror depicting the state of its creator and vise versa.

Of course, it is more complex than that. What you come up with can look clean, professional, and well presented, depending on how much you master the tools of your craft. Although, whether it is pen and pencil or complex 3D modeling tools, the result might not be satisfactory, no matter how professional it looks, and it may be lacking that something–inspiration, soul, lift.

Compare it to a meal, made perfect with all the correct ingredients cooked and presented perfectly but lacking that something to make it great, the one ingredient we can not acquire by just learning the "how to."

Even if we are not happy with what we came up with, we can learn from the situation a lot about ourselves: Does your design give you an open feeling or maybe closed? Is it very complex or simple? A simple or clean design does not necessarily mean a simple designer. It probably means the designer is trying (very hard) to become clearer, which is recreated in the project.

Since this goes both ways, by learning about ourselves, we can learn about our design; by learning about our design, we can learn about ourselves.

If you feel your design is stuck, look at yourself at that moment and you will probably see the same. This can be very helpful, since you can go and do whatever it is you do to get relaxed, inspired, and filled up, in order to be able to shift to another place, more creative, more free.

AWARD OF DISTINCTION IN VISUALIZATION AND ILLUSTRATION

ALSO SEE PAGE #12.

MOR ROTBAT
Wasp

It is amazing to see how our design can give us a direct look at our body, showing us exactly where in our body/mind system we are stuck.

Go and look at the ocean (if you have one near by) or find another outdoor connection to nature.

THE TOOLS or THE BEST ACCIDENT POSSIBLE

The tools we choose can also tell us a lot about ourselves.

Is your tool of choice an extra fine felt pen? Maybe you choose a wide chisel head marker? Maybe both? Maybe you paint with your hands on large scale canvases just to create your initial sketch?

Most of us who hook with specific tools, the ones we feel easily connected to, are the ones that will allow us to go where we want to go. Look at the tools you use, do they give you what you want? It does not have to be unlimited options. It sometimes needs to be just the opposite, we sometimes look for limits. And those limits can allow us to work freely in their boundaries.

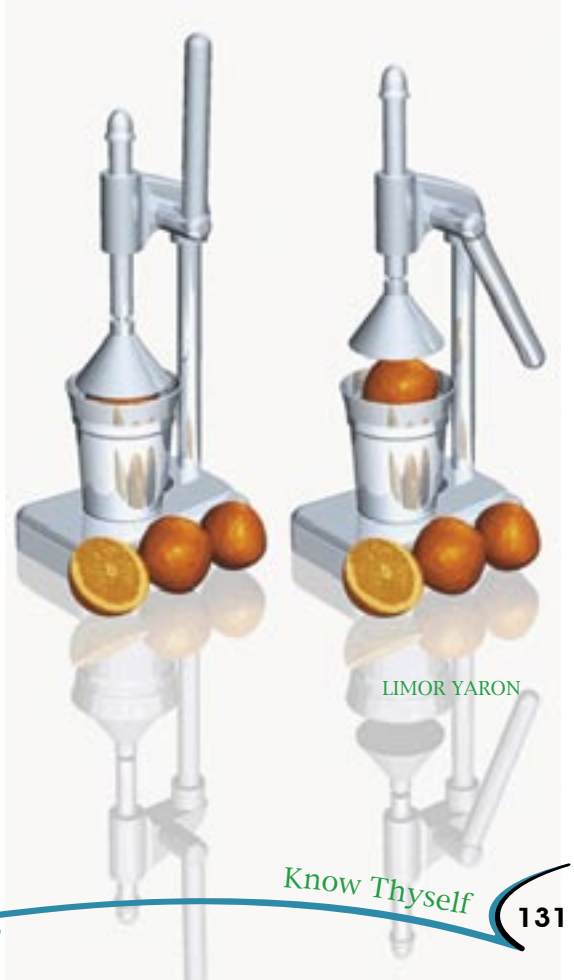
By being interested in the process more than in the result, in the "how to" more than in the "what came out of it", I am looking for tools that will give me the freedom to explore my ideas; I am looking for the tools that will allow me to make mistakes, to give sufficient space for accidents to happen. Those accidents are not really accidents, but rather they are gifts.

SHOMRON SHVUT

MICHAL SHARON

Did you ever make a mistake while working on a design? At first you might get mad—the line was not cut straight, the "not so well glued" part of the model fell apart, but then you look at the result and find that it is intriguing, different from what you planned but inspired in some way, opening a new path to a place you have not visited before and therefore it might be the place you were looking for.

INBAL YAHAV



LIMOR YARON

MEYTAL PERELMAN

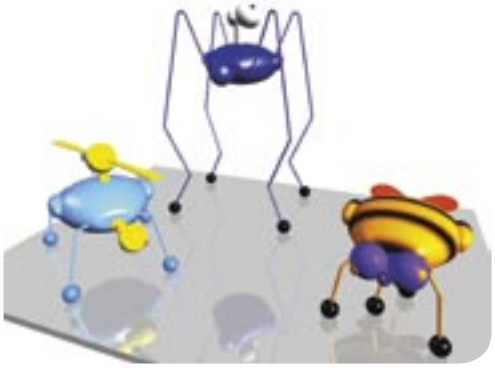
ROY HARIF

MAAYAN NAGAR
Knife

ODED LAHAV

MAYA ROSENFELD

SHLOMI BENNER
Lighter



HILA HAK OVADIA

YAEL OZ

ITAY OHALY
Discman

URI SADEH

Department of Architecture and Landscape Architecture
NORTH DAKOTA STATE UNIVERSITY
Fargo, North Dakota

Forms of Performance
Explorations in a Digital Design Studio

BY GANAPATHY MAHALINGAM, ASSOCIATE PROFESSOR AND DIRECTOR

In the Fall semester of 2005, one of the sections of the advanced architectural design studio in the Department of Architecture and Landscape Architecture at North Dakota State University was taught as a digital design studio that focused on the creation of forms based on performance criteria. **form·Z** was used as the vehicle for the generation of various kinds of forms based on various performance criteria.

In all these problems, the various form generation tools available in the program were used in innovative ways. The emphasis throughout was on forms that were derived by satisfying particular performance criteria. The studio was held for a period of 12 weeks. Many of the students were introduced to **form·Z** for the first time in this studio and developed advanced skills in using it in a relatively short time period.

The performance-based form generation was explored through a set of design problems. They involved the creation of audioscapes, landscapes, thermalscapes, forms of visual desire, and forms derived from matrices. A brief description of the projects follows:

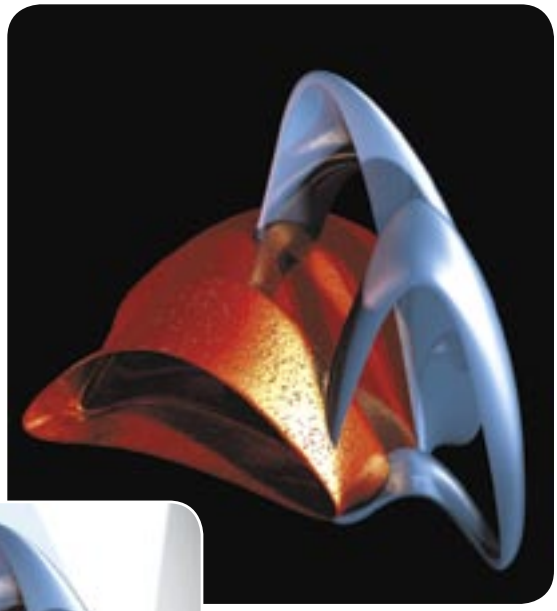
Nestling in the Mother

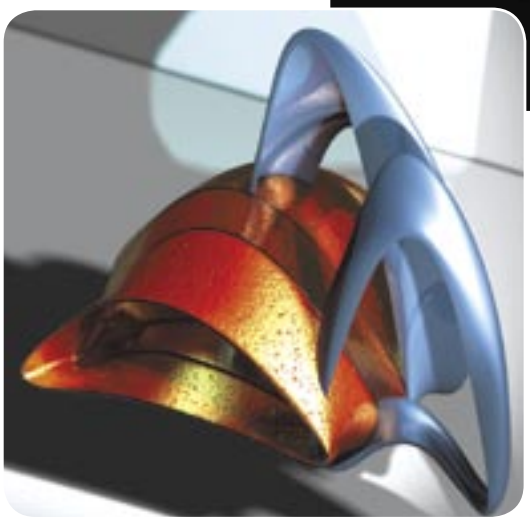
In this design exercise, students were asked to displace a structural matrix and use the spaces created to accommodate various activities.

Given a structural matrix (a three dimensional grid) of a certain volume, students were asked to displace the nodes of the matrix using a number of digital operations. Using the spaces generated by the displacements, the students were asked to accommodate volumes in which various activities could be housed. They were then asked to link these spatial volumes to form a continuous space. Finally they were asked to use the structural matrix to define a structural system that would support this continuous volume within the displaced matrix.

In all these problems the various form generation tools available in **form·Z** were used in innovative ways. The emphasis throughout was on forms that were derived based on satisfying particular performance criteria. The studio was held for a period of 12 weeks. Many of the students were introduced to **form·Z** for the first time in this studio and developed advanced skills in using **form·Z** in a relatively short time period.

JOSH CAROON





NICK BRUHN

On the Verge of Echoes

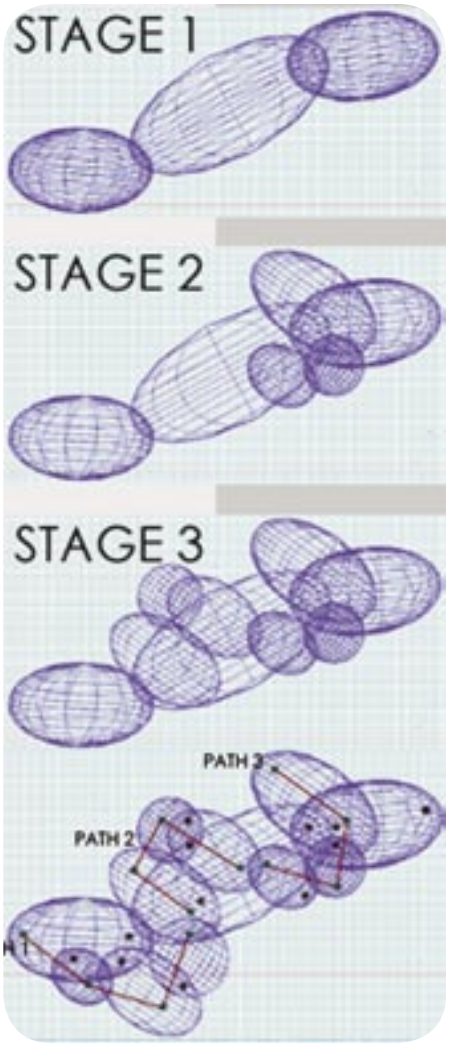
In this design exercise, students were asked to create an audioscape that was on the verge of creating echo conditions for its inhabitants.

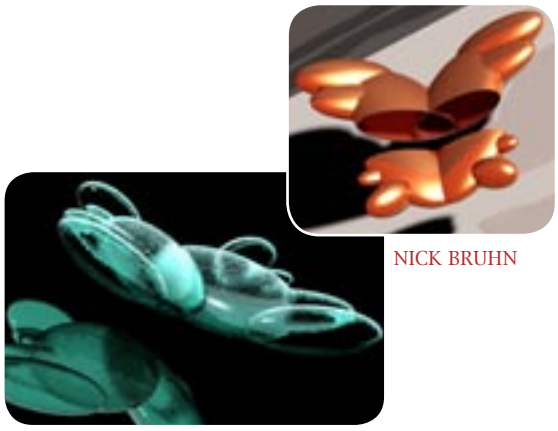
Given a spatial volume, the students were asked to locate 12 sound sources that were distributed three-dimensionally within the spatial volume. They were then asked to trace 3 paths that inhabitants could use to travel through the spatial volume in-between the sound sources. Using locations on the path where an inhabitant could stop, and the various sound sources, the students were asked to create elliptical volumes that represented surfaces that were on the verge of creating echo conditions at the inhabitant's location. Finally the students were asked to merge these elliptical spatial volumes to create a three-dimensional spatial enclosure that was an audioscape.

The main challenge that students faced in creating the audioscapes was in combining the elliptical volumes using the two-way split Boolean operation that had to be carefully implemented.

ROBERT SEHM

ROBERT SEHM

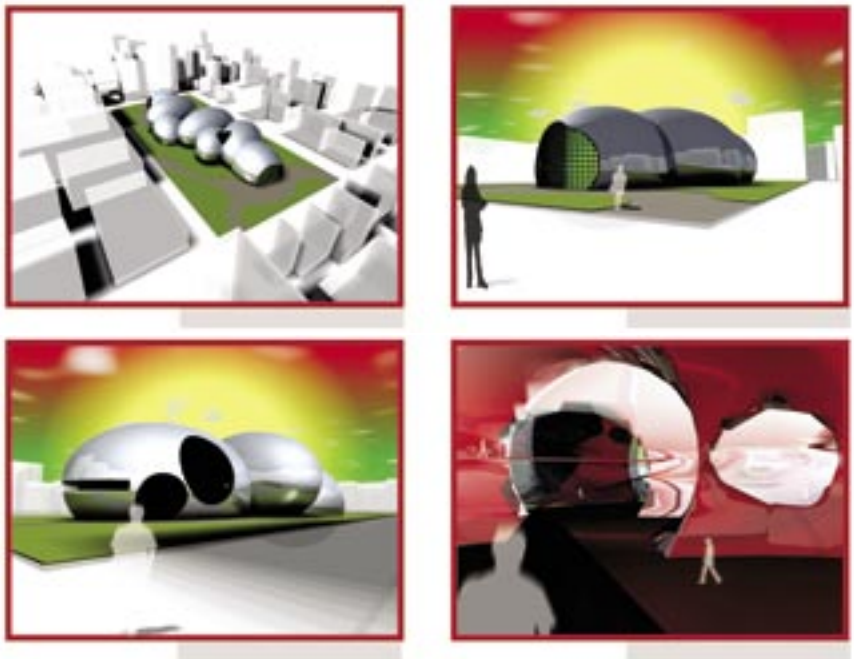




NICK BRUHN

ROBERT SEHM

DEREK KOHLHASE

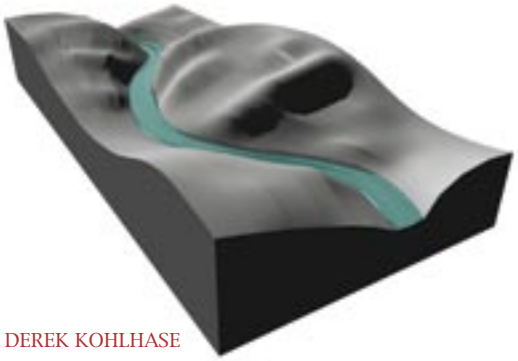


Rivulets of Equal Fathom

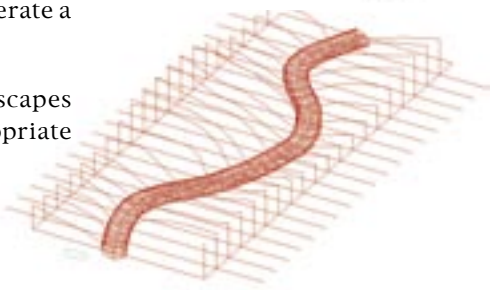
In this design exercise, students were asked to create a landscape that resulted in the formation of rivulets of equal depth.

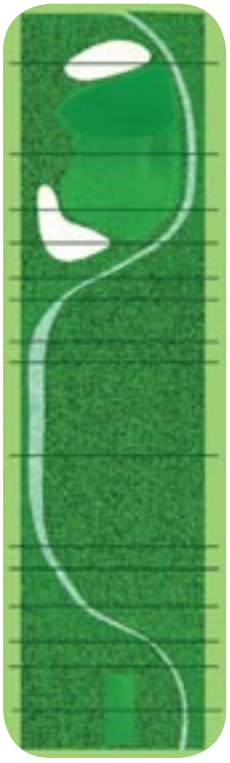
Given an amount of rainfall, and a surface area, students were asked to create land profiles that generated rivulets of an equal depth based on the flow of water generated by the rainfall. They were asked to calculate the flow of water in cusecs (cubic feet per second), define the shape of a channel for this flow for a length of 6 feet, modify this shape to generate new shapes that maintain a fixed depth but the same rate of flow, and use these shapes (land profiles) and flow paths to generate a landscape that created rivulets of equal fathom (depth).

The main challenge that students faced in creating the landscapes was in parameterizing the slope and profile to create the appropriate flow rate of water.

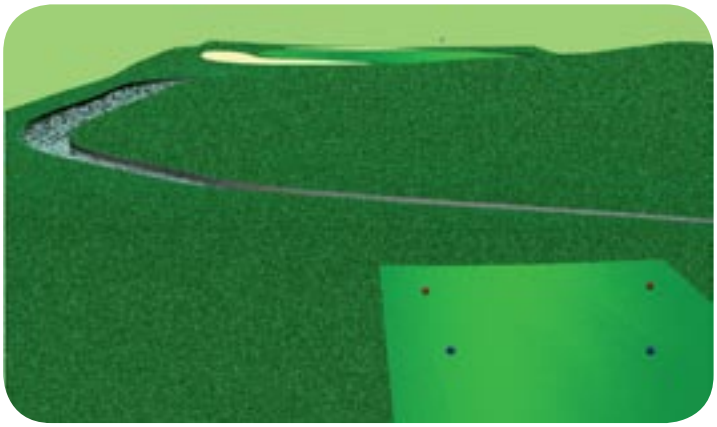


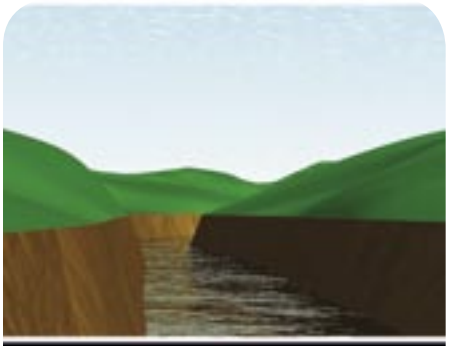
DEREK KOHLHASE

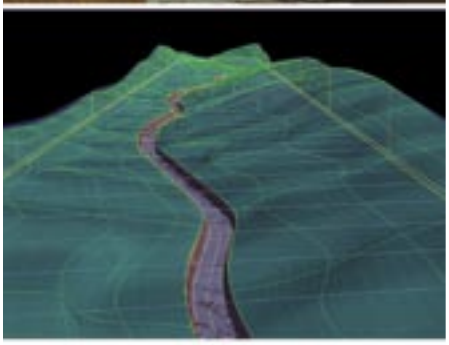


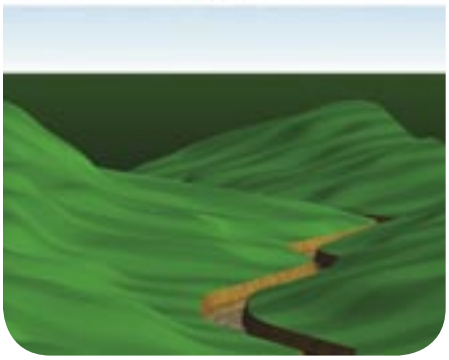


DEREK KOHLHASE

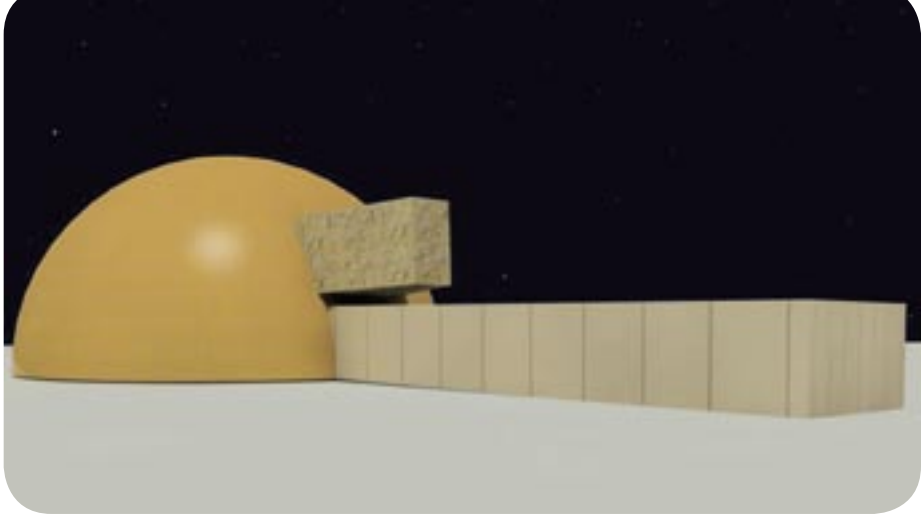








ANDREW DAHLQUIST



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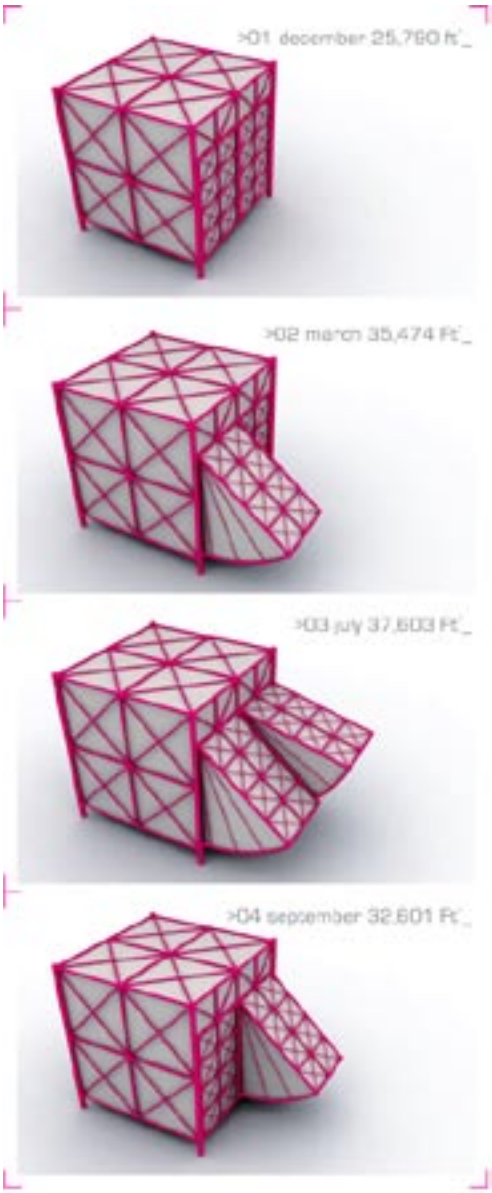
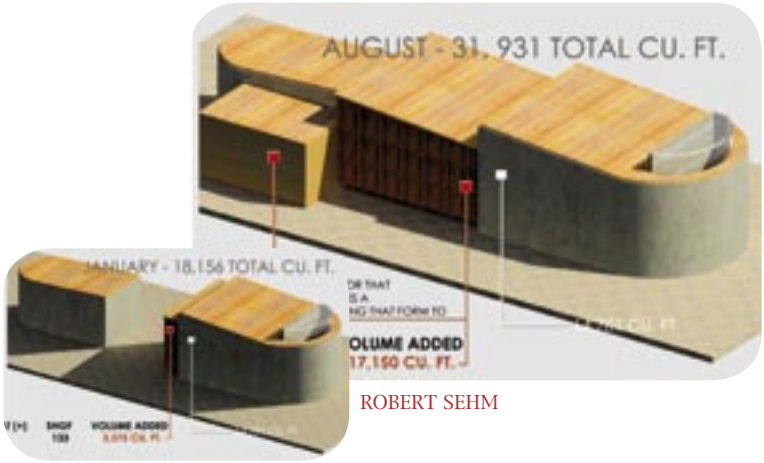


BENJAMIN JOHNSON



ROBERT SEHM

Volumes of Heat

In this design exercise, students were asked to create a series of thermalscapes (spatial enclosures that represented a quantity of heat).

Given a quantity of heat in BTUs (British Thermal Units), students were asked to generate spatial volumes that held that amount of heat at the optimum conditions for human comfort, thereby creating thermalscapes. They were asked to choose a site in the USA to locate these thermalscapes. They were then asked to define openings in the spatial volumes, so that the given quantity of heat could be gained from the sun and maintained in the space during the day. They were also asked to vary the volume of the space to maintain the conditions of human comfort in the space. Finally they were asked to map the ratios of the area of the openings to the volume of the thermalscape for different spatial orientations.

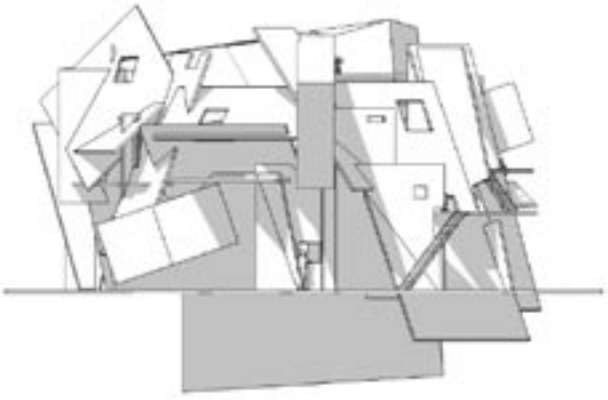
The main challenge that students faced in creating the thermalscapes was calculating the change in volume that was required to maintain the constant conditions of human comfort.

The Space of Visual Desire

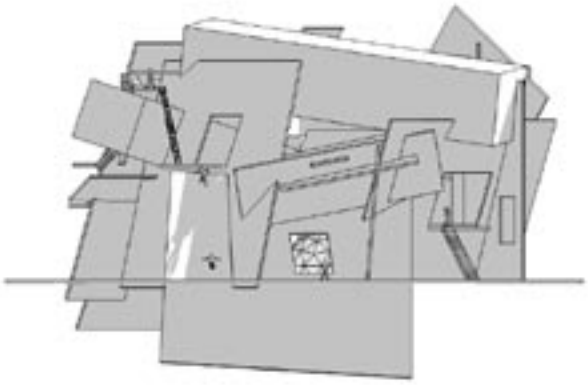
In this design exercise, students were asked to use the frustum of a cone of vision to carve a space of visual desire from a spatial volume.

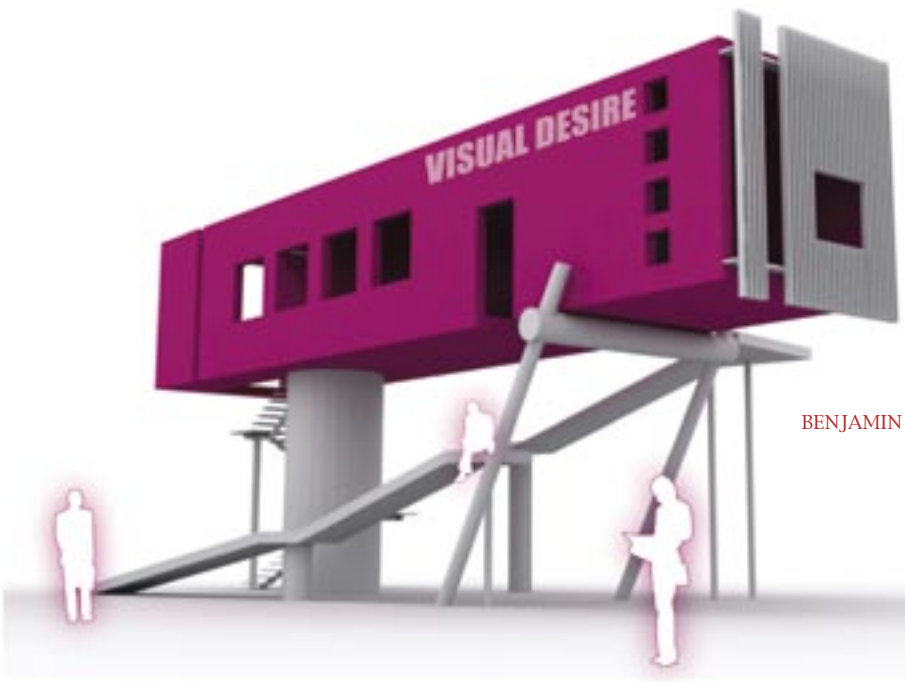
Given a spatial volume, students were asked to define 3 paths that an inhabitant could use to travel through the volume. At fixed locations on the paths, they were asked to orient frustums of cones of vision that looked at objects of interest in different directions. They were then asked to combine these frustums of vision to form a continuous volume. Using this volume, they were asked to carve a space of visual desire from the original spatial volume. Finally they were asked to define a structural system that could be used to support this space of visual desire.

The main challenge that students faced in creating the spaces of visual desire was in defining and orienting the frustums of the cones of vision.

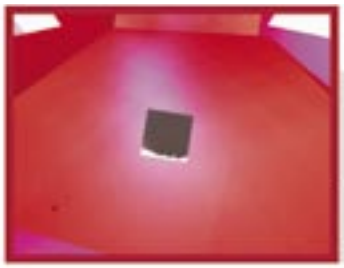


NICK BRUHN





BENJAMIN JOHNSON



DEREK KOHLHASE

What we learned from the 2004–2005 Joint Study Reports

This article summarizes the responses we received to the questionnaire we sent to the Principal Investigators (PIs) of the Joint Study (JS) Program for the 2004-2005 academic year. Once again, the questionnaire we used was similar to previous years, which makes comparisons easy.

Participation

This past year, the JS Program had 243 active members; 154 were in the USA and 89 were international schools. You may recall that last year we revised the requirement for the submission of full reports. Schools now have to send such reports once every three years, while the return of our questionnaire continues to be a requirement. This past year, we received 79 fairly complete reports. We also received 117 responses to our questionnaire. The findings reported in this article are based on the questionnaire responses. The material of the complete reports offered the basis for the articles we invited and are included in this printed part of the Joint Study Report. We cover more details about how the process worked in our introductory article at the front of this publication.

This year there were 8,940 **form·Z** lab seats at Universities across the globe and an additional 4,520 extension licenses, or a total of 13,460. Compared to last year's total of 12,677, this is a 6.2% increase. The totals for the most recent five years are summarized below:

	00-01	*01-02*	*02-03*	*03-04*	*04-05*
Lab Seats	8,591	10,086	9,495	9,160	8,940
Exten. Lic.	3,009	3,306	3,363	3,517	4,520
Total	11,600	13,392	12,858	12,677	13,460

The numbers above show clearly that there is a trend for schools to reduce their support of lab seats and to require instead, or simply encourage, individual licenses on individual portable computers. As a matter of fact, quite a few schools have established programs through which students receive a computer complete with the required software at the time they start their studies.

Among the schools that had lab seats, there were 51 with 50 or more seats and 12 schools with 100 or more seats. The University of Southern California had 503 seats, the most in a single school. The Ohio State University was second with 405 seats.

The trend we reported last year regarding the split between key and network based installations, which is that more schools tend to prefer network installations, continued, as summarized below:

	2002-03		*2003-04*		*2004-05*	
Keys	3,139	33%	2,317	25%	2,022	23%
Network	6,356	67%	6,843	75%	6,918	77%

Used across the board

While we counted close to 1,000 courses that were mentioned specifically as classes where **form·Z** was used this past year, many of the reports tend to simply state that "**form·Z** is used across the board", "is used in all studios", or "is available in all the labs." When specific courses are mentioned, they include (in order of frequency): design studios, CAD/modeling courses, thesis projects, construction/structures courses, fabrication courses, seminars, energy, graphic communications, lighting, and color.

Special mention should be made of the fabrication or CAM courses, which are mentioned in at least 40 instances and where **form·Z** appears to be associated with a variety of success stories. Involvement with fabrication equipment appears to be another trend of recent years and **form·Z** is reported to be supporting these undertakings quite successfully.

Best features of form·Z

The fourteen features of **form·Z** that were identified by at least 10% of the PIs as being its main strengths are listed below. The list is very similar to last year's and contains no surprises. The two features mentioned by more than half are "easy to learn/use" and "modeling power", which are exactly the same features consistently taking the most "votes" in recent years. If anything, the frequency by which they are mentioned is even higher this year.

feature	#	%
easy to learn/use, intuitive interface	95	81
3D modeling range/power	89	76
rendering	53	45
3D character/visualization	41	35
interoperability (import/export)	35	30
effective design/conceptualization tool	28	24
effective teaching tool	26	22
fabrication support	22	19
cross platform	20	17
flexibility/versatility	19	16
accuracy	18	15
topological levels	15	13
parametrics	14	12
technical support / forum	12	10

Three items that were in last year's list did not get enough votes this year, while six new items were added. The one that deserves special mention is "effective teaching tool", which was not on the list last year, but was covered by a separate question that was not included this year. Here is what one PI had to say: "**form·Z** definitely has the ability to excite the students..."

Improvements and new features desired

The features mentioned by at least 3 of the respondents as requiring improvements are summarized below.

improvements	#	%
animation	12	10
drafting	9	8
interface	6	5
navigation	5	4
rendering speed	5	4
stability	4	3
nurbz	4	3
help environment	2	2
parallel tool	2	2

Another 16 items were mentioned by one or two respondents and are not included on the list.

Regarding desirable new features, the following table summarizes those requested by at least 3 respondents.

desirable additions	#	%
object/light animation	20	17
electronic manuals	9	8
history palette	6	5
architectural parametrics	4	3
2D/3D integration/linkage	2	2

There were also another 21 requests made by one or two respondents.

The top request in both lists (animation) was mentioned with the highest frequency in spite of the fact that more animation, including object and light animation, will be included in version 6.0, scheduled for release in early 2006. Most of the PIs that requested more animation also acknowledged that it is coming and expressed approval. Two PIs expressed disagreement with the inclusion of more animation in **form·Z**.

Other than animation, it is interesting to note that the lists of desired improvements and new features are shorter than in previous years. This is obviously due to that many of the earlier requests have been addressed. However, there still remain a few, such as drafting, that have been showing up for too long and it has become imperative that they be addressed.

Administration of the JS Program

About two thirds of the respondents answered the question of how well we administered the JS Program. All but one were positive: 33% said very well, 21% said well, and the rest said excellent, great, fine, no complaint, or OK.

As already mentioned, one of the PIs was unhappy, due to that it took a bit too long to get their network license running smoothly, possibly because communications with Australia, mostly due to the time differences, are a bit more complicated. While we regret these problems, we are happy that it has been a rather isolated instance this year and the vast majority of the schools were up and running with no major problems.

A number of the respondents expressed satisfaction with some of the new policies, such as the requirement to submit reports once every three years, the overlap of the licenses during renewal time, making it optional to upgrade lab licenses when new versions are released, and the new format of the printed report. Many repeated comments we heard in previous years, such as "The JS team has been exemplary in their response." "Thank you. You are always there to answer our questions." "You have a very good follow up on our request over your telephone line technical support. THANKS!" "We really appreciate your supportive staff." "More software companies should have a program like this." Specific praise and thanks to our JS Administrator, Trica Weaver, were expressed by 11 and to our technical support group by 9 respondents.

We also had a few requests: "Make PDF files with editable fields for easier form filling." "Start an 'after school program' to keep the students using **form·Z** in the work force. Some day these people will be running the design world." "Offer a way to apply for a student extension license online."

The form·Z JS extension licenses

You may recall that these are individual academic licenses made available mostly to students for installation on personal computers, which allows them 24/7 access to **form·Z**. From the 243 participants to the JS Program this past year, 138 or 57% of the schools had extension licenses. 65 of these had 10 extension licenses or more, with 22 schools having more than 50 and 12 schools more than 100. The Wentworth Institute of Technology had 752, which is the most on a single campus, with the University of Cincinnati second at 583, and the University of Oregon third at 205.

As already mentioned, this past year, there were 4,520 extension licenses. Statistics for the most recent 5 years are summarized in the following table:

	00-01	*01-02*	*02-03*	*03-04*	*04-05*
USA	2404	2719	2632	2804	3782
International	605	587	731	713	738
Total	3009	3306	3363	3517	4520

From the schools that responded to our question about the extension licenses, 57% had extension licenses. Interestingly, this is the same with the overall ratio of participating schools. To the question of how well the extension licenses worked, all the responses were positive and none said they did not work well, even though there were a few suggestions for improvements. Here are some of the comments we received: "I have no suggestion except to keep it going; students really appreciate the service." "Students who used an extension license had a better grasp of **form·Z**." "The students who participated showed tremendous growth by having 24/7 access to the software." "Our students very much appreciate being able to have the software on their home machines." "It has been a very helpful and useful program."

One suggestion for improvement was repeated by at least six of the respondents and also appeared in other parts of the responses: this is about implementing some more direct ways for dealing with the students, possibly over the internet. Even though this is something we have looked into in the past and was found to present a number of technical issues, it is apparent that we need to investigate again.

Evaluating last year's JS Report

The last item in our questionnaire was asking for feedback about last year's JS Report, especially the printed portion. This was useful information given that, last year, the printed report deviated from the "catalogue" format and followed a thematic approach. The catalogue format was still used for the CD portion of the report, which displayed all the material submitted to us.

About half of the respondents offered an evaluation and/or some comment about last year's printed report. From those that did, only one told us that he prefers the old format. All others had praise expressed in different words, such as: good, excellent, impressive, nicely done, very well produced, or very useful. Here are some of the comments: "I have heard many positive comments about the JS Report from colleagues and students." "The report is beautiful, well organized, and very inspiring for our students." "I must compliment your company on taking the time and effort to prepare such a well-designed and enticing report."

We were, of course, mostly interested in knowing how much the thematic format was appreciated and whether we should continue it. Here are some representative comments: "The thematic approach is an improvement over the catalogue approach. Certainly continue with this." "The thematic approach for the printed report works extremely well. Rather than having a barrage of images without much discipline or focus, the thematic approach gives the **form·Z** academic community a wide series of pedagogic directions. We think this is a much better way of 'reporting' ... and a more useful way of sharing information, which is the point of the report in the first place. Keep on doing it." "This past submittal process was fun! I was especially impressed with the new format and concept. It was a real brainstorm. I think finally after all these years, **form·Z** has become successful enough that people are starting to do really interesting experimental stuff beyond just photo-realistic renderings. Good Job!"

That the JS Report is a "very useful" document was one of the most frequent observations: "Excellent report! I use it in class to demonstrate the range of **form·Z** capabilities." "For an instructor, it is very helpful to see how other schools are exploring the software. The intensity of work being explored is exciting for both educational and professional levels to see." "It is very interesting to get an overview of so much different student work around the world." "The JS Report helps me stimulate those students who are not yet interested in 3D." "The Report has many suggestions that help me run and manage my class." "The creative ways in which people use **form·Z** were very stimulating and gave me ideas for improving my own courses." "It is a powerful visual example for students and faculty."

Finally, suggestions for improvements. While many of the PIs expressed satisfaction with the appearance of the printed report, a few thought that the graphics need to be improved: "Calm down the graphics." "I would prefer consistent graphic design throughout. Let the project images provide the variation." We agreed with these recommendations and you will find this year's graphics a lot calmer. After you go over the new report please feel free to tell us how you find it.

Concluding, auto·des·sys wishes to express sincere thanks to the Principal Investigators, the Lab Managers, and above all the students whose work is filling many of the pages of this publication. We hope that publicizing their projects will inspire more young designers, whose work we hope to show off next year.

C.I.Y

Potpourri

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▼ JAMES CORNETET,
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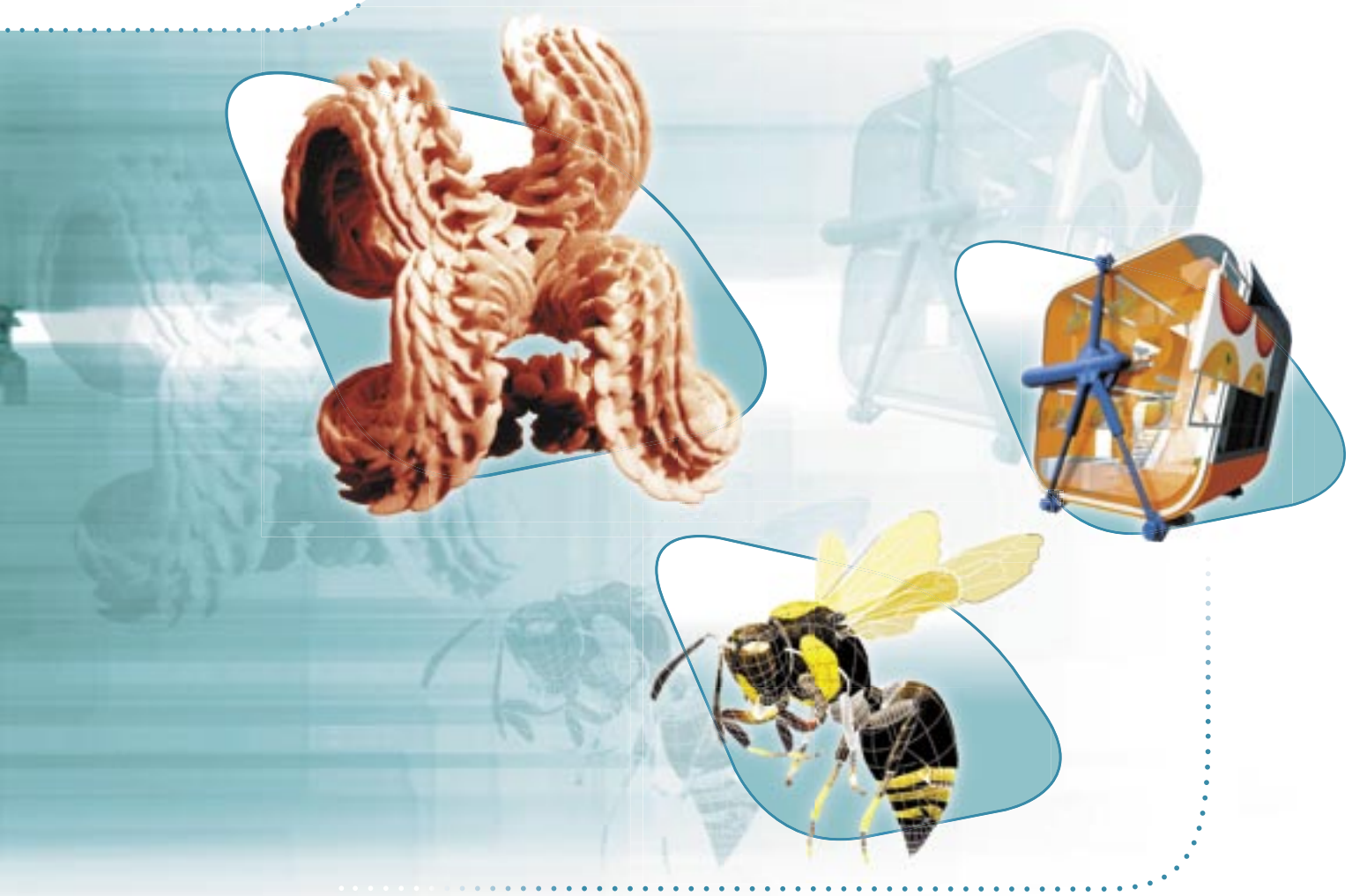

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