

Robert Dunay, FAIA Executive Summary

In his 30+ year career at Virginia Tech, Robert Dunay has contributed to the diversity of architectural education with a record of projects that have informed national and international audiences. This educational commitment, nurturing thousands of students, has helped build the **nation's top ranked architectural program**. His work has been recognized with three University **Excellence in Teaching awards**, leading to his recognition as one of the **Most Admired Educators** (one of 26) nationwide in 2009 by Design Intelligence. Professing the Vitruvian value of architecture as the cross connection of disciplines, Dunay has championed the integration of the design fields through teaching, research and building.

Dunay has led a series of innovative projects that situate the studio experience to join practice, research, and outreach. Having taught at all levels in the curriculum, Dunay advances the studio as a structured environment embracing alternate professional modes. As Upper Year Program Chair, he established an atmosphere of individual responsibility and collaboration, a sustaining foundation of the upper years' program. As associate dean, he championed administrative decisions that elevated the learning environment of the student. In the dean's office, Dunay initiated and led the development of the industrial design program, achieving national prominence in less than a decade. The success of **collaboration between architecture and industrial design** led to the formation of the School of Architecture + Design comprising the additional programs of landscape architecture and interior design.

Innovative work led by Dunay received prominence through invitations to exhibit at the **International Contemporary Furniture Fair** (ICFF) at the Javits Center in New York (2003 and 2005). Research into industrialized processes received further invitations to cutting-edge international expositions - **Salone Internazionale del Mobile**, Milan, Italy; the **Cologne Furniture Fair** in Germany; and most recently in the Materials and Processes section of the International Contemporary Furniture Fair in New York.

Throughout, Dunay has strengthened the linkage between architectural education and issues of national interest. His leadership role in three U.S. Dept of Energy Solar Decathlon Competitions has established collaborative partnerships between educators, students, practitioners, corporate sponsors and industry leaders. The projects have been recognized with the **NCARB Prize**, an NCARB Honorable Mention, and the AIA Presidents Award for the Best Solar House. The research has been part of **testimony before the U.S. Congress** regarding national energy policy; it was the subject of a video conference organized by the Information Office of the U.S. State Department; and the 2005 solar house now resides as part of the **State Science Museum** in Richmond, Virginia where it serves as a central exhibit and resource for the public school system. Lumenhaus, the 2009 Virginia Tech solar house, recently won the international Solar Decathlon Europe competition in Madrid, Spain.

The broad dimensions of Dunay's educational and professional engagement range from **inside Architecture** – a week long course for high school students that immerses participants in a college experience of design, to **International Architecture and Design** (IAD) – a AIA certified continuing education course that has taken hundreds of senior professionals on international study. As a committee member of the Virginia Design Forum Committee, through multiple lectures and exhibitions at the Virginia Society AIA, in presentations at national and international conferences, and as a member of five landscape architecture accrediting teams, Dunay has offered examples of innovative cross-disciplinary research and practice to enlarge the educational frame. Five State Awards of *Excellence in Architecture* from the Virginia Society, AIA complement these efforts. Most recently Professor Dunay was invited to join the **Braun Prize Forum** held at the P&G/Braun world headquarters in Kronberg Germany. Every two years Braun searches internationally for designers from major universities, companies/organizations and the media to select the 2009 Braun Prize winner.

EDUCATION

Robert Dunay is T. A. Carter Endowed Professor of Architecture in the School of Architecture + Design at Virginia Tech. Before assuming his current position of Director, Center for Design Research, he chaired the Upper Years Professional Program, served as Associate Dean for Finance and Administration, and became the first director of the industrial design program. He has taught at all levels of the graduate and undergraduate programs and is responsible for establishing some of the best shop and fabricating facilities of any architecture program nationally. He and has served on five landscape architecture accrediting committees (LAAB) and has served as a consultant to industrial design programs and the Georgia Tech Solar Team. His work links interests in design, architecture and planning. His career goals can best be summarized as *territories of opportunity* between disciplines, pursued through three primary areas of activity:

Architectural Education as a life-long commitment to the intellectual and professional development of students and the Vitruvian ideal of architecture as the cross-connection of disciplines

Integrating Research and Teaching charges the studio with alternative modes of investigation and the opportunity to bring real world experiences into the curriculum

Engagement with Society disseminates information to the public and provides for interchange between academia, practice and the corporate world.

Architectural Education

In his 30+ year career at Virginia Tech, Robert Dunay has contributed to the diversity and depth of architectural education. He is an educator who understands the inner and outer worlds of the student. He knows that the pragmatic and philosophical subjects of the design disciplines must be charged with life, with social significance if they are to become embedded in the educational experience. He finds that the value systems built by the student must be nurtured and challenged to embrace the serious responsibility of architecture. Teaching at all levels and across disciplines, Dunay establishes the studio as a structured environment welcoming alternate professional modes while inculcating a sense of the enduring value of architecture as a service to society. This concept is articulated in a brief essay for an article in *inform Magazine* (Mar 2009) under the title, **Society, Materiality and an Architectural Education**.

Our world presents a cacophony of interests and products. The electronic and digital environments increasingly promote a seamless flow of advertisement. Overtly and subliminally, an unbridled mania to consume influences many of our decisions. We come to believe that the possessions we station around ourselves are indispensable for revealing to others why we are different, and perhaps better. Status, not stature, dominates the daily interchange of individuals through belongings. In this consumer society the sign value of a product replaces the thing. The image projected by objects in everyday life, and the magnification of that image, serves to imprint oneself on society. Products are accumulated for their ability to enhance personal identity. Everyone walks around with their own headlines stapled to their chests.

This may be an inevitable dynamic of society. Ever since the tenets of modernism were discarded, there has been a radical rethinking. The rational and analytical foundations of design posited by the Bauhaus and its successor Ulm were overthrown by a much freer and open approach. The abstract purity of Braun gave way to the psychological, symbolic and poetic works of groups such as Memphis. Functionalist design and its attendant characteristics of homogeneity, structural

clarity and perfection were replaced by visions from pop art and pop culture. Everything suddenly was possible. Design became fun, immensely popular, and accessible to the mass market.

The design studio is not immune. In some quarters, the cornerstone of architectural education suffered from commodification with the categorization of students as customers. Students of architecture reveled in the newfound potentials of expressing oneself through design - self-expression became indistinguishable from self-disclosure. In reaction, the critique of the design studio as insular, detached and disenfranchised from contemporary issues arrived on its regular interval (every four or five years). Calls for the overhaul or dismantling of the design studio found a way into editorials, erudite papers and accreditation assessments. The educational bankruptcy of the studio once again became a seasonal mantra for those seeking recognition in the education conference circuit.

Sometimes it is best to hold one's head low until the debris passes over. Arnold Schoenberg commented towards the end of his career that his music was not tainted by success because he was "protected by neglect." In three words he defined both the province and refuge of the studio. The studio environment depends on individuals building a real place allowing for the occasion of education. It is a sphere of knowledge embedded in activity commensurate with a finely tuned instrument that must be played every day, managed every week and examined every semester. It is one of the few forums by which the tendency of architecture as commodity can be resisted through an iterative asking of fundamental questions - how to stay relevant without sacrificing ideals; how to complete projects without compromising ideas; and how to sell concepts without selling one's soul.

It is little wonder that the members of Memphis disbanded and went on to other things. Their work was a polemic. As a salvo by the avant-guard against the status quo, their goal was to break what had become sterile and stagnant, and open new possibilities. The many who attempted to follow could not handle the luxury of unrestrained freedom. Any effort un-renewed exhausts itself under its own weight. The movement's followers, lacking ideals and the vital energy of its founders, have fallen by the wayside, suffering from the vicissitudes of caprice, mannerism, empty form and hollow rhetoric.

Chaos theory tells us that the flap of a butterfly's wings in a remote province in China is capable of changing the weather patterns in North America. Though the chance of altering consumerist values in today's society is remote, the possibility to shift the inertia is present. The design studio remains the place to provide a foundation to navigate in world of diversity through slowness of approach and redundancy of questions. It causes one to reflect upon the nature of design and re-examine its place and potential in the world. Thus, the true efficacy of the studio seeks introspection over entertainment. It is a probe sent out with the hope of discovering essence. It follows the distant trajectory of an ideal, while freezing an instant of the process.

The commitment to education is marked by unswerving dedication to students. Dunay often teaches heavier loads. He regularly teaches freshmen studio in addition to upper classmen, believing the superstructures of careers must be built on foundations that start in the first year of a college education. His tenure in the dean's office yielded insights insuring administrators serve the student and faculty. His educational commitment and leadership throughout the college, nurturing thousands of students, has helped build the nation's top ranked architectural program. Recognized with three **University Excellence in Teaching** awards, he recently received national recognition as one of the **Most Admired Educators** (one of 26) in 2009 from *Design Intelligence*.

As Professional Program Chair, Professor Dunay established an atmosphere of



Architecture, industrial design and interior design students reviewing work.

individual responsibility and collaboration, a sustaining foundation of the upper years' program. He instituted the *Pella Prize* for the best thesis project. As the program's first sponsored prize, the award has become a competitive institutional landmark for all students within the program. As liaison to the architects designing the addition to the architecture building (Burchard Hall), Dunay was the university representative responsible for the building program. His leadership insured that the physical composition of the studios support the educational concept. An open plan devised with strategic support facilities allows for the programmed and spontaneous occasions of education.

During his tenure as Upper Years Program Chair, Dunay produced a series of documents that set markers for the educational experience. Some include:

- *Design/Research: the Carilion Studio*: students from industrial design followed hospital personnel to examine health care delivery. Each analyzed and designed a product that would improve specific tasks or procedures in the hospital.
- *Plaster: Building Experience in Material and Processes* - an experimental workshop with Carlton Newton, a nationally distinguished artist from Virginia Commonwealth University. Students from architecture, industrial design, landscape architecture, interior design and theater arts participated making prototypes of alternative uses of plaster
- *Olivio Ferrari: Portfolio* - exhibition catalog of essays and design work concerning education and teaching, four color, 214 pages. Responsible for concept, production, graphic layout and editing of 100 contributors.
- *Education and Profession - Dualism or Dichotomy, Thoughts on Architecture* - catalog of essays from lectures delivered at the southeast regional conference of the Association of Collegiate Schools of Architecture (ACSA). Authors include: Donald Singer, AIA, Tampa, FL; David Wagner, AIA, Charlotte, NC; James Mount, Atlanta, GA; Robert Currie, AIA, Miami, FL; Gresham, Smith and Partners; and others.
- *What Makes a Good Building?* - compendium of a question first posed to students and to lecturers including: E. Fay Jones, AIA, Fayetteville, AR; Rudy Hunziker, Lugano, Switzerland; Theodore Ceraldi, AIA, New York; Fritz Schwarz, Zurich, Switzerland.

While in the dean's office, Dunay established special venues to enhance the educational programs. His leadership has resulted in critical national recognition and he has gathered diverse thought around critical issues. An example are the Ferrari Symposiums that link academics, practitioners and students in a forward thinking series of lectures and discussions.

Ferrari Symposium I: Architecture + Industrial Design explored new possibilities of design residing between the disciplines of architecture and industrial design and honored an individual who dedicated his life to the diversity of the design fields and their relation to architectural education. This was the first public forum of the new industrial design program at Virginia Tech and recognized the legacy of Olivio Ferrari, a seminal professor who set the original tenants for the College of Architecture. Dunay curated the exhibition of his work as a presentation of design thinking across disciplines. The book, *Olivio Ferrari: Portfolio* created and edited by Dunay, is an exhibition catalog and a testament to teaching, through the essays of 100 practitioners (former students) who reflect on the relation of practice and their architectural education.



Olivio Ferrari: Portfolio
a book of 100 essays - reflections
on architectural education

Ferrari Symposium II: Convergence: A Question of Disciplines was expansion of the first gathering. Two themes were considered; opportunities of practice offered by a symbiosis of disciplines; and, issues of discipline identity in a context of

collaboration. Unique teamwork and instances of technology expanding the horizons of a practice were set in play with the limits or boundaries that define excellence within a particular area of inquiry.

John Seely Brown, chief scientist of the Xerox Corporation and director of the **Palo Alto Research Center (PARC)**, was the keynote speaker. Brown, a pioneer in the field of digital culture and the anthropology of the technological workplace delivered a lecture titled, "Living, Working, Learning in the e-Age Where Convergence Meets Non-Convergence." The presentation, a lively discussion of combining bits and atoms, unfreezing the corporate mind, and reaching through technology as if it did not exist, was intended to draw out a position regarding creativity from a scientific point of view. The event was certified for learning units as an AIA continuing education course.

Ferrari Symposium III: Territories of Opportunity carried themes from the previous events. Territories of Opportunity between disciplines offers views on the designer's ability to distill design criteria in a changing world, and the potential created by the merging of disparate entities. The overlapping of two entities is intended to produce creative chances.

Selection of the keynote speakers enlarged this theme: Bruce Mau Design presented a position of design in an interconnected and **changing world of digital technology and media**. Lee Polisano, President of KPF London, discussed **architectural research and materiality in practice**. The contrast between the virtual world of media and the physical world of building is a central issue for students considering their future place in the profession.

Industrial Design

As the symposiums infer, Professor Dunay took the lead in the development of the industrial design program. As chair he formulated and developed its philosophical underpinnings in addition to college administrative responsibilities. He led curriculum development, was responsible for faculty hires, **expanded the program from 25 to 125 students**, brought the program its **first accreditation** and elevated it to national prominence in less than a decade (15 in the Design Intelligence ranking). The program is in very high demand; it thrives within its own degree specificity while playing as an integral partner to the other programs in the School of Architecture + Design.

Student success rarely is attributable to a single faculty – it is a collective effort. National student awards, however, indicate the strength of an overall program. National exposure broadened with students winning two of three scholarship awards offered by the Industrial Designers Society of America (IDSA). Two industrial design students won national competitions for a work that is being patented and pursued by a number of companies for production. P&G awarded faculty in industrial design a \$40K grant to integrate product development into the studio. The *Carilion Studio* was initiated by Dunay through a regional non-profit health care corporation. A \$7500 grant allowed undergraduate students to conduct research in the hospital environment (see *Carilion Studio: Teaching and Research* in the exhibits section under teaching).

Though external validation is a measure of increasing importance, Dunay strives to promote an internal atmosphere of excitement, curiosity, and responsibility. An attitude of constructive challenge and collaboration is maintained from year to year following the vision articulated by Professor Dunay: *Through ethical responsibility, innovative research and corporate partnerships, an education in industrial design will place the humanistic delivery of services, systems and products at the forefront of technological development.*

Dynamic cultural, social, and economic landscapes require intellectual and physical skills to assimilate complexity with conviction amidst the kaleidoscope of change. Professional competency is indispensable, yet it may not be sufficient to effectively compete in design that is drawn toward world markets. Change is everywhere, driven by evolving technology that makes possible products that were once the stuff of dreams. At the forefront is industrial design. Immersed

in speed, the discipline navigates the interface between man and machine. In an age where feedback is becoming increasingly abstract, the interface more impenetrable, and experience more digital, it is incumbent of educational curriculums to advance a case for the quality of things, as well as thoughts. As we pursue an heightened awareness of the world, we admonish students to seek a refinement of their inner sensibilities and values.



Dry run in studio. AIA Virginia Society convention exhibit

In addition to the commitment to daily activities within the School, Dunay lectures broadly and comprehensively regarding architectural education, the studio, and design research. In the past decade, he has presented at **four international conferences; two national industrial design conventions; and invited as speaker at eight AIA state conventions.** He and his students have presented work at **five major international design shows** (ICFF 2003,05,09; Salone de Mobile, Milan, Italy 2008, Cologne Furniture Fair, 2009) and produced and mounted **four exhibitions at Architecture Exchange East, Virginia Society AIA.** Most recently, Professor Dunay was invited to participate in the **Braun Prize Forum** held at the P&G/Braun World Headquarters in Kronberg, Germany. Every two years, Braun searches internationally for design professionals from prominent universities, companies/organizations and the media to choose the Braun Prize winner 2009.

Dunay participates in a range of related design venues. He has served as a team member of the **Landscape Architecture Accrediting Board (LAAB), serving on five accrediting teams,** to programs throughout the country. He is a member of the Industrial Designers Society of America (IDSA) and participates regularly in industrial design events. Dean Urs Gauchet of the New Jersey Institute of Technology contracted with Dunay to serve as an **consultant for the creation of an industrial design program** at that institution. The program was established in 2008.

Integrating Research and Teaching

The NCARB Prize recognizes faculty for integrating practice and the academy. Dunay has been a leader of teams and students and faculty who have been recognized twice (2003 Prize and an honorable mention in 2006). Real-world experience encompassing the entire building process from ideation through construction is typically limited in architecture curriculums. Before graduation, architecture students rarely work as partners with students from other disciplines, yet upon entering the workplace they must collaborate on all aspects of building design and realization.

Through the studio Professor Dunay has enhanced the educational experience by allowing students to participate in collaborative design/build projects that promote research within the undergraduate curriculum. This effort started with the first Solar Decathlon competition in 2002 and has continued through nationally and internationally recognized projects that link teaching, research and practice:

- Solar Decathlon, 2002
- International Contemporary Furniture Fair (ICFF), 2003
- ICFF, *Material Presence*, 2005
- Solar Decathlon, 2005
- *Extreme Makeover/Home Edition*, 2006
- Salone del Mobile, Milan, Italy, *Industrialized Furniture*, 2008
- Cologne Furniture Fair, *Industrialized Furniture*, 2009
- ICFF, *Materials and Processes Section*, 2009
- Solar Decathlon, 2009
- Solar Decathlon Europe, 2010, Madrid

Solar Decathlon 2002

The Solar Decathlon Competition, sponsored by the Department of Energy charges teams to design, build and operate the most effective and efficient house powered solely by the sun. In addition to design and construction, these houses are transported to the Mall in Washington, D.C., and assembled for testing, competition and public exhibition. The scope of the endeavor includes design, procurement, fabrication, and construction, all completed by students with varying degrees of skill and expertise. The 16-month process involves teamwork and strong student leadership. Problem solving,

information flow and integration, alternative generation, ideation and innovative troubleshooting are all part of an experience where the consequences of decisions are real, sometimes painfully real. Dunay served as a primary faculty (with R. Schubert) overseeing all aspects of the project.

The complexity producing a solar house could not be met by a single discipline acting in isolation. Nor could success be achieved in a mode where each group contributing its expertise in a linear sequential fashion. From the beginning, the process had to be integral within a free flowing network of information. The team was composed of graduate and undergraduate students from five disciplines - architecture, industrial design, building construction, electrical and mechanical engineering. It also included faculty and practicing architects and engineers who served as advisors. It is rare for such a group to work together in the university setting. Yet, **when these students enter practice, collaborative skills will be an essential part of their day-to-day activities.**

Students received insight into the workings of collaboration, the roles and opportunities of related disciplines and the hidden facets of design, such as procurement, material characteristics, fabrication, supplier contacts, and financial viability. The confidence developed by the team was validated with the NCARB Prize, the **BP Award for Most Innovative House on the Mall**, and an **ID Magazine award for Best Concept**. 140,000 people visited the Mall to see the houses and hear the students present the innovative and energy savings aspects of the design.

ICFF 2003 As part of a series of efforts to expand the studio experience, lessons learned in the 2002 Solar Decathlon were reformulated and re-presented as innovative building components, materials, and furniture for the 2003 International Contemporary Furniture Fair (ICFF) at the Javits Center in New York. Students from architecture and industrial design (including two from the solar team) combined elements from the solar house with new furniture prototypes as a single environment. The exhibition was recognized with the *Editors Award* (editors of top international design magazines) for *Best Design School*.



setting up in the Javits Center, NYC

ICFF 2005 A second invitation to ICFF was used to link the next Solar Decathlon effort with investigations of the undergraduate industrial design studio. The theme for ICFF 05 was *Material Presence* and included new research from the latest round of the solar house competition in conjunction with investigations focused on the expressive capacity of materials and processes. This work was included as a full page layout for the *Metropolis ICFF Directory* as a prospectus for the School. Exposure at the Jacob Javits Convention Center in New York City situates the program with the best products in the country enhancing the image of the School. Students received a first hand look at the latest design trends as they exhibited their work side-by-side with top designers.

Solar Decathlon 2005

The Solar Decathlon of 2002 was an educational watershed challenging the relation between academia and practice, and between research and its corresponding contribution to society. Though the first team graduated, the knowledge derived from the initial endeavor was transferred to and transformed by the 2005 team. The new project achieved a higher level of complexity expressed in an elegant simplicity. As the 2002 project was a ribald confederation of pristine parts, the 05 work was reconsidered as a systemic whole. The initial theme of the *art of integration* has been realized through a process of design that strives to avoid problems and discover new forms embodied with a sense of the sustainable and the beautiful.



photographing furniture with the 2005 house and the Mall as a backdrop

Students and practitioners from architecture, industrial design, interior design, landscape architecture, mechanical, electrical, and structural engineering developed new and efficient components comprising a house that derives all energy from the sun. These efforts were validated in winning the critical awards judged by panels of national experts. The Virginia Tech house was ranked first in the architecture, dwelling, daylight and electric light portions of the competition. It was also recognized with the AIA

President's Award for Best House, an NCARB Prize Honorable Mention, and a Virginia Society AIA award for Excellence in Architecture. The house now resides as part of the **State Science Museum** in Richmond, Virginia where it serves as a central exhibit and resource for the public school system and general public.



Testimony before Congress

As a result of the research Professor Dunay (with Schubert and Wheeler) were asked to testify before the **Committee on Science of the U.S. Congress** regarding national energy policy. In addition, the **Information Resource Center and the Embassy of the United States**, Madrid, Spain, sponsored a video conference between Dunay, Schubert and Wheeler and European counterparts. The title was, "Energy issues and the Virginia Tech Solar House." This was a live broadcast between Blacksburg, Washington, Barcelona, and Madrid.

Extreme Makeover/Home Edition



Extreme Makeover meditation room includes research from the 05 solar house

One month after the Solar Decathlon Competition, Dunay (and J. Wheeler) were asked to design a house for the television show *Extreme Makeover/Home Edition*. Though the show tends toward commercialization, the architects decided to participate by bringing architecture to help a client in distress. The brief called for the design concept to be completed overnight; schematics, design development, and construction documents concluded in six days; site logistics, sub-contractors and material acquisition organized in one week; demolition, construction and certificate of occupancy in 144 hours (six days).

The absurd brief was balanced by **the experience of the students who participated in the Solar Decathlon. The Extreme Makeover house would not have been possible** without their participation in the previous design build effort. In addition to the design of the house, Dunay and colleagues agreed to procure all materials and construct the meditation/exercise room themselves. The new house had to address accessibility issues while providing a quality of life that is optimistic and beautiful. Thus, the design included a nostalgic image of building with a counterpoint of technical curiosity. The heavy timber trusses on the front facade give a street identity of home, while the meditation/exercise room linked to the master bedroom offers the promise of innovation.



construction of the meditation room

Research developed in the solar house was employed in the design of the meditation/exercise room (aerogel filled polycarbonate panels, translucent wall assembly, changing color walls, floating roof, vertical light, material contrast). *French doors from the master bedroom lead across a small bridge to the meditation/exercise room. This is both a view and a destination. Lights can be switched from the bedroom illuminating the stone wall inside the detached building. The walls can be adjusted to any color desired, thus enhancing the nighttime image of the house and creating a special atmosphere conducive to reflection. The natural light in the meditation room is unlike any found in the house. The vertical light entering directly through a skylight in the center of the square plane defines a room of one's own.*

Twenty million people saw the project in a special two hour episode. It brought the University and the School considerable national recognition, and was recognized with an award of *Excellence in Architecture* from the Virginia Society AIA. Most importantly, **the experience gave students a direct understanding of the power of architecture to improve the quality of one's life.**

Salone Internazionale del Mobile



Testing of exhibit structure and lighting

Concurrent with research on the solar house, Dunay (and Wheeler) developed a parallel set of investigations concerning *industrialized furniture*. This involved coursework, state-of-the-art machines, visits to fabricators and suppliers, and participation in regional, national and international expositions. Combined modes of working between architecture and industrial design allowed for innovative prototype development and material experimentation leading to an invitation to the Milan Furniture Fair. The **Salone del Mobile is the largest event of its kind in the world.** Designers, manufacturers and suppliers for the domestic retail market come to Milan, Italy to exhibit their products and gain a larger share of global markets. The fair showcases the best new work in furniture design from more than 50 countries. Two thousand companies presented products, and of the 340,000 visitors 210,000 were



Testing exhibit set-up



Milan Airport - arrival a few hours before set-up

Cologne Furniture Fair



Cologne Fairgrounds

Solar Decathlon 2009



Robert Zahner with students at his factory in Kansas City

international. Judged on a competitive bases, students were given the opportunity to exhibit their work along with the best designers in the world.

Virginia Tech's exhibition, "Industrialized Furniture," consists of student work designed with emerging digital and technical processes, particularly computer controlled systems. The pieces in the exhibition link experimentation in design research with emerging digital and technical processes. Computer Aided Design (CAD), Computer Numerical Controlled (CNC) machines, and Computer Aided Manufacturing (CAM) have been the province of the automotive and aerospace industries. Until recently other, design fields have peered with envy at the precision of the structure/function relation that yields material performance. These possibilities are now entering the consciousness of architects and industrial designers, changing not only the way one acts, but the way one thinks. Traditional constructs of 2-D and 3-D give way to a simultaneity that transmits information directly from the designer to manufacturer. Mass production accompanied by the promise of ultimate customization makes a new relation to the world. Exact copies of digital models; zero waste; rapid production; on-time-assembly; efficient shipping; lower cost; reduced labor; higher quality control; and sustainable design are all claimed for this new world.

The logistics of getting to Milan and setting up the exhibition proved as challenging as producing innovative furniture. The entire process is an education regarding the complexity of design and the consequences of real decisions in a changing world. Every detail must be considered – from the weight and size of each work; the material content; production process; image and identity; and the function, whether it be practical or polemical. From an idea about materiality to the production of furniture, students embarked on a world journey.

The exhibition in Milan led to an invitation to present work at the **Cologne Furniture Fair**. The content of the work, highlighted by the integral display system spans architecture, industrial design, furniture design, computer science and industrialized processes. An exhibition that started in the state AIA Convention in Richmond, Virginia, moved from Germany to New York City, with an invitation to the **2009 International Contemporary Furniture Fair**. This work was presented in the *Materials and Processes* section of the exposition - student work transcending the bounds of the studio and thrust into the world of design research.

An ongoing effort is the Solar Decathlon 2009. This represents the third time Dunay has led a team (with Wheeler and Schubert) of students from across the university. Led by architecture, Lumenhaus includes advancements from the 2005 house. More technologically advanced, the house control systems promote energy efficiency in a beautiful dwelling. Students worked with practitioners, suppliers, consultants, manufacturers and installers to design and build the house. During the course of the project, students visited offices and factories to gather expertise and establish corporate partnerships. Some include:

- *Hafele, America*, New York - students visited the New York City showroom and worked with technical staff to determine best hardware for the solar house projects
- *Cabot Chemical*, Boston, MA - students visited the plant and helped develop techniques for filling polycarbonate panels with aerogel (Nanogel)
- *A. Zahner Co.*, Kansas City, MO - teams of students visited twice to learn about fabrication techniques for the house zinc paneling and stainless steel sliding shutters
- *Ove Arup, Resolution 4, Front Inc, SHoP* - New York offices visited by team members to receive feedback on the design development of the house

In preparation for the competition, the house was organized to be part of the *Sustainable Communities; Greenovation* exhibition at the **National Building Museum**. During the month of September the house was situated on the west lawn as part of the institution. Students worked on the final assembly of the house, started testing systems, and gave daily public tours. The house as an instrument of teaching and research, also serves as public outreach for information about technology and energy in residential

housing. Following the competition on the National Mall in October 2009 the team was invited to exhibit the house on Times Square in NYC, where it appeared on Good Morning America in January 2010. A team of ten students spent one week in the city giving public tours to large crowds of interested visitors.



Sam Champion, abc News, broadcasts Lumenhaus live from Times Square

In May 2010, the house was shipped to Madrid, Spain to compete in the international Solar Decathlon Competition. Virginia Tech was one of two American universities representing the United States of 20 research universities from throughout the world. Sixteen students from architecture, landscape architecture, mechanical and electrical engineering and computer science comprised the solar team, spending five weeks in Madrid. Their role was to assemble and disassemble the house, operate the house during the competition, explain the design concepts and operations to an international cast of jurors, and give public tours.



Solar team with the American ambassador to Spain

Lumenhaus, the Virginia Tech solar house, placed first overall in the competition. In addition to winning the overall prize, the Virginia Tech house was judged first in Architecture by a team of jurors led by Pritzker Laureate, Glenn Murcutt. Lumenhaus received other awards including second in Communications, third in Industrialization and Market Viability, third in Comfort Conditions, third place in Lighting Design, and third in Appliances and Functioning. The competition attracted over 190,000 visitors and more continue to visit the web site. It was particularly rewarding for the students to win out over four German teams that had significant financial support from their federal governments.

Engagement with the Public and Practice

As a convener and organizer of experts, and as a resource to discuss and provide a vision for change, the engaged university serves as a bridge between the necessary abstractions associated with the generation of knowledge and the realities of application. Part of the role of an educator is to provide for outreach opportunities in conjunction with teaching and research. Much of Dunay's work integrates these three activities. A most recent example is the solar house of 2005. It presently resides in front of the **State Science Museum in Richmond, Virginia**. As part of the museum since 2007, it serves as featured exhibit regarding alternative energy and sustainability in residential design. The solar house is now showcased as a foreground exhibit of the museum and as resource by the public school system through on site visits and web portal access.

inside Architecture

Extending the domain of architectural education beyond the university, Professor Dunay has developed two programs that have national and international following. *inside Architecture* is a week-long summer experience for students who are curious about the world of design. For more than a decade, the program has provide hundreds of students insight into the ways in which the designer thinks and works. Primarily a hands-on experience, students work with long-time educators and practitioners in exercises designed to stimulate discussion and discovery of the world of design. Initiated ten years ago with six students, 100 students were admitted from over 150 applicants in 2010.

International Architecture and Design

On the other end of professional practice, Dunay (with Jack Davis) has created an innovative continuing education program that engages practitioners. In its fourteen year history, *International Architecture and Design* (IAD) has **served over one hundred senior and junior members of architecture and design firms throughout the nation**. Situated in the center of Europe this professional architecture course gives quick access to a diversity of geographies and cultures. Emphasis is placed on the contextual and planning principles behind contemporary and historical architectural conditions existing at the scales from the object to the city. Firms have used the program as a research/study tour and strategic retreat. A recent article in *Metropolis Magazine* (Oct 2009) documents an ongoing partnership between HEWV + Co. (an architecture firm in Norfolk, VA and Tampa, FL) and IAD. The introduction to the 2006 catalog reads:

Previous excursions have taken us from the desk on the bridge overlooking Mario Botta's employees to a five star resort in a decommissioned Swiss army fortification built deep within the Gottardo Pass mountaintop. We immersed ourselves in stone and water at the baths in Vals and listened as stories of Riva San Vitale were woven with a cultural, political and design history of Europe. Riding as a tight knit family over Alpine switchbacks, no one dared lean too far for fear of tipping our van's moment of inertia sideways. The views were breathtaking and enlivened by the risk, what little of it there really was. Each day finishes with dinner together - conversation re-enacting collected experiences.

We start this year in Milan, sacrificing the Bar Ticino for the Galleria. It is probably an equal trade. We are not chasing monuments, the goal is more reflective in nature. Thus, we finish in Venice, a city so illusive no one is certain it is really there. One must periodically check to see for sure, if from the Piazza, the tower of St. Mark does stab the sky.



Visual Arts Center Exhibition



Taubman Museum Exhibition - Solar House Components

Further service to the profession and the public at large includes:

- Membership on the *Design Forum* of the Virginia Society AIA - the bi-annual event hosts national and international speakers on subjects researched and determined by the committee.
- Member of the Board of Directors the Blue Ridge Chapter, AIA
- Five awards of "Excellence in Architecture" from the Virginia Society AIA.
- Four exhibitions at *Architecture Exchange East*, Virginia Society AIA Convention
- *Time for Design*, Visual Art Center, Richmond, invited exhibition, design innovation
- *Taubman Museum of American Art*, Roanoke, Virginia, Eclipsis System, Virginia Tech Solar House
- *Habitat for Humanity House* - work with fifth year students (former solar students) to design and build a Habitat House. Utilizing past research, the structure is a hybrid of pre-fabricated modules and site built construction staying true to the Habitat value of owner hands-on involvement with an innovative element of industrialize assembly. An extension of the studio is employed to the local community.

Next Steps

Design research does not effectively fit the scientific model and does not enjoy the traditional funding sources of other disciplines. The iterative, exploratory nature of design tends to make the process appear redundant and sometimes without focus while the technical rationality of the scientific method is accepted without question.

The research from three previous Solar Decathlon Competitions forms the base of a new center that integrates teaching and research and links academia with practice and industry. The research agenda is to explore industrialized building through innovative building components and systems that respond to changing conditions, optimizing energy use and conservation, while providing an higher quality architectural space.

The Center for Design Research at Virginia Tech links the technical rationality of science and the rich ambiguity of design with a focus of enhancing the implicit values of human activities. Cultivating a new breed of designer within the urgency and excitement of discovery, it aspires to E.B. White's commentary, "There seems to be no place where the cultures meet – At the heart of thought and creation we are letting some of our best chances go by default. The clashing point of two subjects, two disciplines, two cultures – of two galaxies, so far as that goes – ought to produce creative chances. In the history of mental activity that has been where some of the breakthrough came." The vision of the Center for Design Research is explore the line between the perceived certainty of calculation, and the artistic, intuitive processes that designers bring to situations of uncertainty, instability, and uniqueness ultimately to merge design with science and business.

The following pages trace a series of projects over several years that integrate teaching and research. Blurring the boundaries of the conventional studio, academia is linked with industry and practitioners giving undergraduate students a real working window into the complexities of the profession.

Solar Decathlon 02 Washington D.C. September 2002

Real-world experience encompassing the entire building process from ideation through construction is typically limited in architecture curriculums. Before graduation, architecture students rarely work as partners with practitioners and students from other disciplines, yet upon entering the workplace they must collaborate on all aspects of building design and realization. This project is driven by a multidisciplinary approach that integrates design and modeling; materials selection and construction; and the operation, testing, monitoring, and evaluation of an architectural work. Early collaboration among diverse disciplines was fostered; ultimately contributing to a curriculum that integrates the technical and the aesthetic.

As part of the Solar Decathlon Competition sponsored by the Department of Energy, the work involved the design and construction of a solar building that serves all the needs of a small house. The charge was simple - to design, prototype, assemble, disassemble, transport, and finally reassemble a solar building on the Mall in Washington, D.C. This endeavor is made more complex when one considers the design and construction had to be completed by students with varying degrees of skill and expertise. The 16-month process involved teamwork and strong student leadership. Problem solving, information flow and integration, alternative generation, ideation and innovative troubleshooting were all part of an experience where the consequences of decisions were real, sometimes painfully real.



During the competition, students present all components and aspects of the house including construction details

International Contemporary Furniture Fair (ICFF) New York 2003 2005

As the largest exposition of domestic products in the country, the International Contemporary Furniture Fair (ICFF) has an international following. The 2003 exhibition focused on innovative use of materials and building components as developed for the first Virginia Tech Solar House. Students were challenged to design the exhibit demonstrating concepts in the solar house. The shipping crate served as the exhibit with folding and sliding walls and floors that presented or simulated components of the house that competed on the National Mall six months earlier.

The theme for ICFF 05, *Material Presence* included continuing research for the 2005 solar house competition in conjunction with investigations focused on the expressive capacity of materials and processes. Architecture and industrial design students collaborated on a line of inquiry that set the stage for research into industrialized processes and material fabrication.

This exhibit featured experiments in material with an emphasis on polycarbonate as a structural base and light capturing medium. The exhibition also presented related research regarding polycarbonate that was being investigated for the 2005 solar house. Some of the work here was transferred to the development of the translucent wall system.



International Contemporary Furniture Fair 2003 and 2005

Opportunities for architecture and industrial design students to present their work in the context of top world design



Solar Decathlon 05 Washington DC. September 2005

The Solar Decathlon of 2002 was an educational watershed challenging the relation between academia and practice and between research and its contribution to the profession. Though the first team graduated, the knowledge derived from the initial endeavor has been transferred to and transformed by the 2005 team. The new project achieves a higher level of complexity expressed in an elegant simplicity. As the 2002 project was a ribald confederation of pristine parts, the new work has been reconsidered as a systemic whole. The initial theme of the *art of integration* has been realized through a process of design that strives to avoid problems and discover new forms embodied with a sense of the sustainable and the beautiful.

The second Solar Decathlon Competition presented further opportunities to challenge the ideals of solar housing design, integrate technology and architecture, and ultimately promote solar power. A collaborative of students, faculty, and staff from the departments of architecture, industrial design, interior design, mechanical, structural, and electrical engineering came together to design, build and operate a unique solar house that demonstrates a comfortable living and working environment, excellence in sustainable construction, and strong architectonic expression.



View looking across dining area to living room.



Construction approaching final stage with testing of all systems.

Students prototyping translucent wall assembly



Initial testing of LED color lighting



Living room at night with selected color.



Student at a chemical plant helping to determine best method of filling polycarbonate panels with aerogel.



Various stages of set-up on the National Mall, Washington D.C.



Extreme Makeover/Home Edition December 2005

The accelerated schedule for design and construction of a house for ABC's "Extreme Makeover: Home Edition," seemed just short of preposterous. As a further measure of difficulty, in addition to designing the house, members of the 05 solar team agreed to procure all the materials and build the detached meditation room.

Expertise of faculty and students in the School of Architecture + Design, along with corporate partnerships, made this project unique. Through an impossible schedule, uncooperative weather and a logistics cacophony, a house of architectural merit and constructive quality emerged, benefiting a deserving family.

The experience and dedication of the Solar Decathlon team made this possible. A network of industry contacts and construction experience acquired through the Solar Decathlon competition were instrumental for the sophisticated prefabrication and material assembly demanded by this project. Research explored in the solar house has now been realized in another application.

From the master bedroom french doors lead across a small bridge to the meditation/exercise room. The nature of this room - reflection and contemplation - required special attention to material and spatial composition. LED lights in the wall allow for any color desired enhancing the nighttime image of the house and creating a special atmosphere conducive to reflection. The polycarbonate walls transmit beautiful translucent light while providing a very high insulation value.



The stone wall and the polycarbonate panels act in contrast. The heavy materiality of the slate (permanence) is set against the ephemeral translucency of the wall assembly.

The skylight in the center of the square plan provides a focal center for the individual and works with the clerestory to establish the mystery of the floating roof.



Industrialized Furniture Richmond, Milan, Cologne, New York 2007 08 09

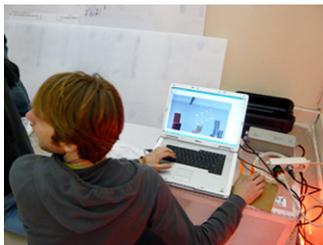
Computer Aided Design (CAD), Computer Numerical Controlled (CNC) machines, and Computer Aided Manufacturing (CAM) have been the province of the automotive and aerospace industries. Until the recent past, design fields have peered with envy at the precision of the structure/function relation that yields material performance. These possibilities are now entering the consciousness of architects and designers, changing not only the way one acts, but the way one thinks. An experimental course employing the network from the solar research projects provides students an insight into the potentials and complexities of new fabrication techniques.

Students' works seek form through new technologies. The resulting furniture is a testing ground for architectural decisions and production processes

that can be transferred to other scales. The exhibition started with an invitation to the *Milan Furniture Fair*. During development, a short notice opportunity arose to make an exhibition for the state AIA convention. Finding a concept to present unfinished work, and design, construct and transport a full exhibition was a perfect setting for a dry-run of the exhibition that was to go to Milan. It was decided to hang all the pieces, indicating their unfinished state, yet creating an environment of curious engagement. A demountable 20' long box beam assembly with an aluminum egg crate undercarriage was designed for easy transport and structural integrity. The exhibition and students subsequently traveled to Milan and Cologne with a final destination in the *Materials and Processes* section of the *International Contemporary Furniture Fair* in New York City.



Architecture Exchange East - Virginia Society AIA, Richmond, Virginia



Salone Internazionale del Mobile - Milan, Italy



Cologne Furniture Fair - Cologne, Germany



International Contemporary Furniture Fair (ICFF) - New York

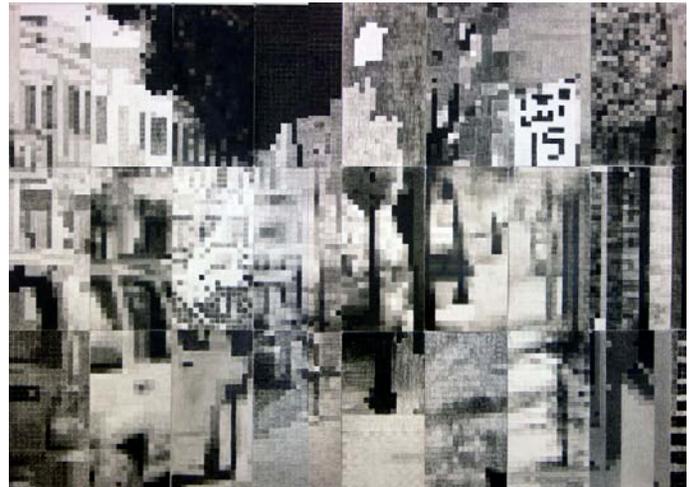
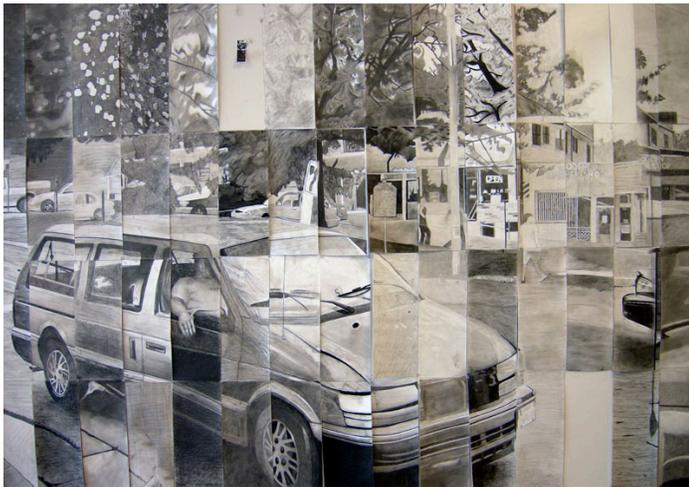
Collaboration First year

First year education is critical to the development of the opportunity and responsibility of architecture.

Depicted in the following exhibit is a drawing exercise that establishes an environment of collaboration and discipline. First year students from architecture, industrial design, interior design and landscape architecture are given three 1" x 3" sections of a large photograph. They are asked to increase the size six fold in a drawing that replicates the original small tile. The large mural is reassembled in a collaboration of

group dynamics. The mural is the main intersection of the town, giving new students an insight to an urban space that will become a reference over the coming years of their education. Also shown is a variation were 2nd year students executed the same assignment with the variable of scaling the tiles with half inch squares of solid gray tones.

The following page shows some of the documents Dunay has produced concerning design education.



One Hundred and Eighty Students - One is Many Many is One
Drawing exercise in which each student produces elements of a greater whole



VIRGINIA TECH INDUSTRIAL DESIGN

School of Architecture + Design

Students from the program of Industrial Design at Virginia Tech recently won two of three national scholarships offered by the Industrial Designers Society of America.

Andrew Valentine, a third year student, received a \$2500 undergraduate scholarship and Martha Sullivan, a graduate student, was awarded \$1500 from the Giannino Graduate Scholarship. Both prizes are based on excellence of individual work and promise within the field.

The students were recognized at the IDSA national conference in Austin, Texas in September of 2006. Depicted opposite are Andrew's design for a life vest and Martha's dinnerware place setting titled the *Galaxy Collection*.

F A C U L T Y
 Robert Dunay Mitzi Vernon Bill Green Ed Dorsa Ron Kennitzer Akshay Sharma
 Director

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VIRGINIA TECH INDUSTRIAL DESIGN

We are pleased to announce the program of Industrial Design in the School of Architecture + Design at Virginia Tech has been granted full accreditation by the National Association of Schools of Art and Design. Significant acknowledgement of national recognition include:

- 2003 International Contemporary Furniture Fair Editors' Award for Best Design School
- GreenBlue e-Design National Competition - 2nd Place Cradle-to-Cradle Computer Products and Recycling Systems
- Emhart Technologies and NASA Brief Magazine International Create the Future Contest, Merit Prize
- International Michelin Design Challenge Competition Second Stage, Design of a Concept Vehicle
- I.D. Magazine Awards, 2003

F A C U L T Y
 Robert Dunay Ed Dorsa Bill Green Mitzi Vernon Clive Vorster
 Director



opposite: graphic by Jason Zabelkowsky





Solar Decathlon - Europe Madrid, Spain June 2010
lumenHAUS an industrialized prototype

As a design/research effort, students and faculty are developing new ideas regarding residential construction and the use of energy in buildings. Students considered the lessons learned from the design, construction and operation of the 2002 and 2005 Solar Decathlon houses. The concept of *Responsive Architecture* was developed by the architecture team and the name branding of LumenHAUS was determined by the marketing group.

With each iteration the complexity of the design increases as does the diversity of the team. In addition to architecture, industrial design, building construction, landscape architecture, mechanical, structural, and electrical engineering, the programs of green engineering, materials science, power electronics, computer science, and marketing joined the project.

During the course of design, students visited consulting architecture and engineering offices, fabricators, and suppliers including Ove Arup (New York), Zahner (Kansas City), Kullman Building Industries (New Jersey) Cabot Chemical (Boston).

In January 2010, 12 students gave public tours while the house was exhibited on Times Square in New York. A team of 16 students spent five weeks in Madrid, Spain competing in the international competition. LumenHAUS won first prize over 17 research universities. Lumenhaus received other awards including second in Communication and Social Awareness, third in Industrialization and Market Viability, third in the Comfort Conditions, third in Appliances and Functioning, and third place in Lighting Design.



lumenHAUS on Times Square - New York



Mechanical consultant and early design session



Robert Zahner explains sheet metal prototype



Juhani Pallasmaa and design development



Team with American ambassador to Spain



LuminHAUS team in Madrid



Team briefs the Spanish Minister of Housing