Building Synthesis: Integrating Form and Performance
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Introduction:
The exploration of building systems within academia often removes many of the pragmatics of practice. Since architectural design has the potential for a multitude of construction responses, the majority of which are driven by factors far beyond the proverbial drawing board, there is now a requirement for architecture students to look more at process and to allied professions to gain an understanding of how a material or technology can be applied to meet both aesthetic and performance requirements. ‘What do you want to see?’ is fundamental in terms of design but, if you want to achieve success on site and efficient energy performance, a building must be realized through available and emerging materials, technologies and construction systems.
Building Synthesis Course:

Building design is a multi-disciplinary collaboration. An architect (now more than ever) needs to be aware of processes and technologies that will impact the perception, experience and performance of a building. The Building Synthesis course is developed specifically to support the final, comprehensive studio at the graduate level. The course seeks to investigate, develop and apply strategies at various scales of operation using current studio design projects as a focus and testing ground. Thus the design of building assemblies and environmental systems are reviewed from the perspective of poetic intent and the necessity for pragmatic responses to the complex issues of site, context and program. These two approaches are not set out as a binary or opposing condition, but rather as part of an overall and holistic solution which privileges balance over deterrence.

With a focus on energy efficiency and building performance analysis within the design process, students diagram and test assumptions and perceptions of their designs using a wide range of media. The importance of working on design and environmental analysis in parallel is essential to realizing design solutions where reduced energy consumption and improved building performance compliment rather than compromise aesthetic intention.

Program:

The studio assignment focused on tall buildings (50-60 stories), with one million square feet of high-end office space as a required part of the program. Forty-eight percent of current energy consumption has been attributed to commercial building. It is the environment in which many of us spend our working day and it frequently falls short of a satisfactory provision of desired comfort levels. The studio problem addresses an ethical obligation to raise the issue of large scale building and environmental strategy design within the graduate curriculum.

Spatial comfort has a direct correlation to employee performance at work. Byron Stigge of Buro Happold Engineers articulated this succinctly when he equated the construction budget of an office building their firm had worked on (designed to be primarily naturally ventilated) to just one year’s worth of salary costs for the building’s occupants. By addressing the building both at the scale of the body and the city, students begin to understand how our perception of ‘comfort’ might be re-considered at these multiple scales.
Multi-disciplinary:

A number of visitors, including partners and directors of some of the most highly regarded engineering and architectural practices, came to the school to lecture and participate in class throughout the semester. The contribution of multi-disciplinary voices introduced an important aspect of practice to the development of students’ ideas and solutions. Each of the visiting practitioners plays an important role in challenging the way office space is conceived, developed and built - they represent the exception rather than the norm.

visitors in fall of 2006 included:
Sauerbruch Hutton Architects, Berlin/London
Nico Kienzl, Director: Atelier Ten Environmental Engineers, New York/ London
Nicholas Holt, Associate Partner of the Technical Group : Skidmore Owings and Merrill Architects, New York
Byron Stigge, Senior Environmental Designer: Buro Happold Engineers, New York/ London
Jane Wernick, Principal: Jane Wernick Associates Ltd. Consulting Engineers, London
Julia Barfield, Partner: Marks Barfield Architects, London
Joel Loveland, Director: Integrated Design Lab, Puget Sound
Tim Macfarlane, Partner: Dewhurst Macfarlane and Partners Consulting Engineers, New York/ London
Roberto Bicchiarelli, Executive Vice President: Permasteelisa Cladding Technologies Ltd., USA

(Alli Dryer)
‘Working’ Conclusion:

Typically the teaching of structures and MEP (Mechanical Electrical & Plumbing) within architecture programs is not related directly to current studio projects, and as such it is compartmentalized and separated from the design process. Building Synthesis is integrated completely with studio and consequently students have a better grasp of the impact of design decisions on technical strategies and vice versa; they are actively encouraged to use analytic assessment to develop their current design at multiple scales. Synthesising course content and studio projects knits technical and aesthetic aspects together. The design process, even at its earliest iterations, must be considered as a productive feedback loop between form and performance.

Whilst charged with preparing students for the profession, final year graduate studio also offers the opportunity to change practice and perceptions within the market environment. If the ‘best of practice’ and cutting edge advances are discussed and explored within the academic realm as a form of research development there is a real and essential opportunity for a sustainable mind-set to penetrate through education into practice. The integration of environmental systems into a clear, comprehensive and elegant design solution cannot be a post-rationalized ‘band-aid’ application. It must be a synthesized and integral part of the design process with clear intentions of a strategy operating at multiple scales. Student and faculty feedback, and the studio projects themselves, showed that this method of multi-disciplinary dialogue has been very constructive in the development and understanding of the possibilities for addressing environmental, structural and envelope strategies for tall buildings - bringing into question many of the assumptions about ways in which large scale building is currently developed in this country.

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building sections below (left to right): Zoe Edgecomb, Alli Dryer, William Russell, Hope Dinsmore, Jim Richardson, James Pressly, Ben Thompson, Matt Hural
Impetus

Today's city office building design must address the complexities of evolving worldwide collaborations among individuals and groups. It must also respond to the speed at which information can be stored, retrieved and disseminated. Simultaneously, office building design must face the concerns of energy consumption and the steady depletion of the earth's natural resources. The design of a high-rise office building for the Institute for Design Research at One Times Square, New York City, rethinks the cubicle-driven, sealed and conditioned office typology and envisions new spaces and technologies that facilitate and encourage a symbiotic life of working people and their natural environment.

Design strategies focus on integrating environmental technologies, passive and active systems, and the quality of work spaces. Environmental considerations such as envelope and assembly respond to the site's inherent climatic and contextual conditions. Research as well as collaboration with studio visitors allowed these solutions to develop holistically from the outset.

This is architecture that values process over product. The building functions as a living organism, grown from the processes and nutrients of the natural environment and culture of the city.
Concept

The tower is comprised of two bar buildings stitched together by a central core. A narrow atrium opens in the front to address Times Square, and wider sky courts behind serve as lobby and gathering spaces. The building is structured on a 30 x 40 grid and utilizes one-story mega-trusses that tie the two bar buildings together at five-story floor intervals. This structuring allows for a flexible, open office plan that results in transformable spaces for ongoing interactions within the building.

Envelope

The facade is a pre-fabricated curtain wall with an interchangeable panel system. The panels vary in material, width, and angle in order to control the amount and quality of light that is reflected directly or indirectly into the interior spaces. This creates an undulating facade that allows indirect light to filter into the rooms without being too harsh and direct. By varying the widths between each 8’ unit, slots of open glazing are revealed, giving the opportunity to program the interior working environment according to the quality of light available at a specific location. Operable windows in the curtain wall system allow for individual control of light and air. Thus, the façade becomes active on the interior and exterior environments.