

Tue, 25 Nov 2003

To the Class of 1957

This letter is in gratitude for the generous and thoughtful award, the Class of 1957 Career Development Professorship, that I have been privileged to receive. There is no clearer indication of the idealism of one generation than the initiative to support the work and interests of the next. Your class embodies this idealism and for your important support of the work of professors at MIT, I greatly thank you. When I was told of my receiving the Class of 1957 Career Development Professorship, I was speechless - which is not something that happens easily to me. In gratitude to the class, I would like to relate how this award has supported the work that I am involved in.

I am a professor of Design and Building Technology in the Department of Architecture. I am also a graduate of MIT, School of Architecture and Engineering, class of 1985. When I arrived at MIT as an undergraduate I started my studies in Civil Engineering. As I progressed through course 1, I was drawn to the discipline of architectural design as a field in which the technical demands of large scale systems and the sometimes intangible needs of society were brought together in the challenging endeavor to provide an appropriate built environment. After graduation from MIT I continued my studies at Princeton University gaining a Master of Architecture. I then spent the next 11 years working on design projects in two New York Firms, Kohn Pedersen Fox and Polshek and Partners, prior to opening an office with my wife, also an architect. I include this description of my professional experience as an important part of this piece because when I returned to MIT as a member of the faculty I felt a responsibility to impart what I had learned in the profession through my teaching and develop research that would not only contribute to the current discussion in building technology but also be relevant to the leading edge of practice. There exists today a significant distance between the teaching and practice of architecture. Unfortunately, this divide only promises to widen as qualifications for each realm become more and more specialized. My role as a bridge across this divide, while challenging, has been very exciting.

During practice, my interests focused on the materials of architecture, the actual physical stuff of which buildings are made. Since my days as a student in civil engineering I had always been interested in the use of materials in the built environment. In particular I have been interested in the ways in which the materials of the built world, which have changed so dramatically with the introduction of polymers, light metals and composites and the various coatings, thin metal films, organic coatings and smart materials such as photochromic glass, self healing concretes and phase change gels, have generated new building assemblies and architectural form. These non-traditional materials have indeed affected the invention of new assemblies and architectural form. As with the introduction of any new technologies this has resulted in both positive and negative effects. The positive has been a general improvement in the performance of buildings, especially with regard to the efficiency of the exterior envelope and the safety of the building superstructure. Negative consequences have included buildings of poor indoor air quality, improper balance of heating and cooling and compromised durability. The first steel and

glass curtainwalls of the 1950s, while innovative and impressive were ahead of their time in that they lacked the necessary high performance sealants that have only recently been developed. Being ahead of their time also meant that these walls failed ahead of schedule.

Pursuing research topics to the depth that I desired as a part of fulltime practice eventually became impossible and my interests in non-traditional materials clearly had become an initiative that I needed to address by returning to the academic world. As a result, I have been involved in a variety of research projects meant to both rationalize the use of new materials in architectural assemblies and investigate the effects on architectural form and the design process.

During the first few years of my work at MIT, I have published several papers, presented at various conferences, become involved in several product development efforts and been chair and co-chair of 2 international conferences. Towards the third year of my work, I decided that dissemination of much of my research to the architectural and design community necessitated something more than the papers that I had been publishing with various journals. I decided to write a book that would cover all of the primary topics that my research had touched. The book, *Emergent Materials*, was begun during my third year at MIT. Soon afterward, I was informed of the Class of 1957 award. The timing could not have been more fortuitous because, while I had assembled a great deal of material for the book, supporting the effort of the actual writing was still an open question. The granting of the award made it possible for me to consider taking advantage of MIT's junior leave option and take a term to write the bulk of the manuscript. Several months later I had secured a position as a Visiting Fellow at Clare Hall at the University of Cambridge in England, from where I am writing now.

The book is almost finished and a publisher has been secured. It is composed of three sections that treat materials in a much more rigorous way than is currently the norm in programs of architecture around the country (or internationally for that matter). First, it adopts the organization of materials along material classes; metals, polymers, ceramics, composites and natural materials. These designations are treated separately for their contribution to architectural assemblies in light of their particular property envelopes. Second, the book introduces a method for materials selection based on multi-objective optimization, a method popularized by the work of materials science professor Mike Ashby of the University of Cambridge, England, currently a collaborator in this effort. By using the rigorous classification of materials science and a selection methodology based on materials indices, I delve into the heart of the book; the examination of the material composition of buildings, the changes that have occurred over the past 100 years and the next best steps to take to develop a responsible and ecologically sound construction industry. All of this is done under the priorities of never relenting the idea that a technically sound and even inventive architecture is in no way mutually exclusive with the making of buildings that delight and astound the non-designer. Our buildings can both delight and serve well.

A part of the manuscript involves demonstrating ways in which architects may be more rigorous, and strategic, in their approach to research in design using nontraditional

materials. This topic is covered in the final section of the book, where I describe the research projects that I have been directing in the School of Architecture over the past several years. Two highlights are the development of a natural fiber reinforced concrete, a project pursued with the cooperation of the Department of Civil and Environmental Engineering and a structural fabric laminated glass curtain wall that promises to lend greater performance to sophisticated exterior building enclosures for the coming decades.

I cannot stress how much of an aid in these efforts the award has been. It is a frequent concern to many of us young academics working in the building sciences that the dissemination of useful information does not occur in an effective way. The specialized standards committees, engineering societies, and the close-knit community of building scientists may be well-informed, but the architect practicing in the field – the person that is actually in charge of committing vast resources to real-world building projects, is not addressed directly by many of those doing the most interesting research today. However, setting aside the time and receiving the support of the Class of 1957 to concentrate on writing my book is an important step in reaching this community. The assistance that your class has provided has been critical in this effort and has afforded me the chance to reach a much larger audience with the idea that architecture need not be afraid of engaging in technical matters in ways that support and catalyze creative initiatives. The technical and the creative are not two sides of one coin, they actually constitute the matter from which the coin is made.

I would like to thank the grace and assistance of Nelson Disco, President of the Class of 1957. An integral part of the pleasure of receiving this award from your class has been the opportunity to speak to and meet a couple of members of the class. I would hope that meeting others might be possible. I would certainly welcome the prospect. I will surely bring along my finished book for anyone that is interested.

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Cambridge, England
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