Solid States: Concrete in Transition

Michael Bell and Craig Buckley (2010)
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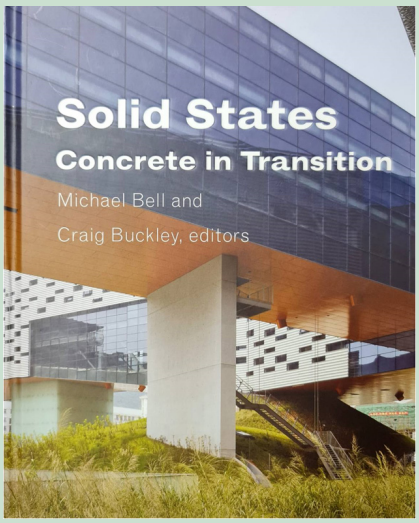

Concrete develops through all the history timelines of human affairs. We already have the progress of architectural form by space organization, concrete construction, and facade design. Especially, the works of Le Corbusier dedicated himself to the potential buildings in all the variation industrial concrete form,spectacular curve, the quote “machines for living”. (Palley, 2010). Furthermore, the great architects such as, Louis I Kahn, Oscar Niemeyer, Eero Saarinen, and Paul Rudolph have generated ideas to cut the restriction of concrete characteristic. The masterpiece reflects the concrete qualities, then created new tracks of concrete construction, such as curve form, organic shape, etc. through their masterpiece.

As the Paul Rudolph’s work in Brutalist building, Yale Art & Architecture Building which expressed “the concrete itself is the real star”. His concrete chocolate box still powerful, although he did a job in the old era of concrete technology. (Beanland, 2016). The semantics of exposed concrete, architects have also toyed with the Identify of this hybrid material. From Auguste Perret’s (1874-1954) “the use of reinforced concrete & antique material turned modern”, to Louis I. Kahn’s (1901-1974) “molten stone & ideological critique of contemporary modernist monuments and their industrial materials”, to Paul Rudolph’s (1918-1997) “mud”, to I.M. Pei’s (1917-2019) “cast-in-place concrete construction technique”, these pioneer architects have often tried to capture the true or imagined nature of the material in a suggestive phase. (Cohen & Moeller, 2006).

"Solid States: Concrete in Transition" is the second documentation from the annual Columbia Conference on Architecture, Engineering and Materials which is edited from an academic conference sponsored by the Graduate School of Architecture, Planning, and Preservation (GSAPP) in collaboration with the Fu Foundation School of Engineering and Applied Science at Columbia University. The purpose of the Conference and publication were the integration knowledge for engineering, architecture, and materials science. In the architectural field, there was the cooperation of architects, engineers, scholars, and academic experts who contribute to architectural progress, aesthetic, and building technology. The book also explores these collaborations and studies architectural works in an academic context, capturing a moment when the professions of architecture, engineering, the scholarship that surrounds and often propels them. The title of the book reflects on the experience still quality of concrete, and the factual aspects of its properties of concrete technology, particularly the material in progress, usage, and global commodity in construction technology.

An introduction part, author raised the issue of discussion "what new forms of practice have emerged in today's economic arena? How has the conceptual reorganization of architectural space and technique allowed us to operate at levels that were previously the domain of international contractors and state organizations? What is the role of "the architectural concept" in an era of deeply engineered materials and complex economic demands on design?" And also brings together group of architects, scholars (academic part), and engineers to discuss the implication of the progress of concrete technologies within architecture and engineering in the varies of building, infrastructure, scale & size, the contexts of new form, coordination, and production which are consisted of the issue of "International to Global",

Figure 1 Yale Art & Architecture Building, Paul Rudolph (Beanland, 2016, p.178)

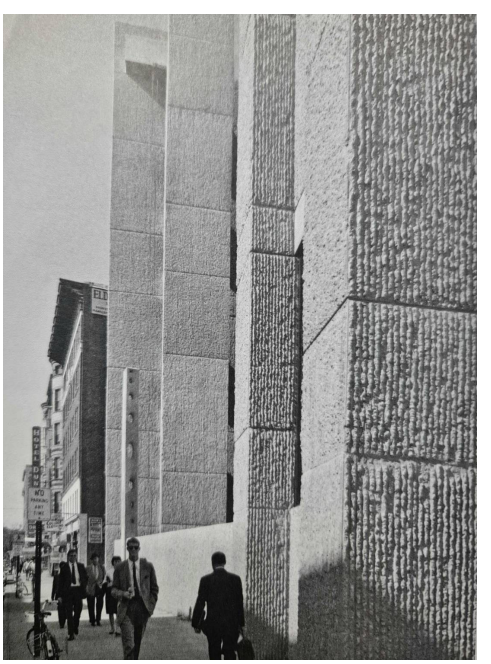

Figure 2 Detail of textured concrete, Yale Art & Architecture Building, Paul Rudolph (Cohen & Moeller, 2006, p.50)

"Concrete and Urbanism", "Concepts of Flow", "Reinforced Professions", "A plastic Space", "Restraining Flow", "Concrete and Sustainability", "The Globalization of Concrete Production", and "the Conclusion".

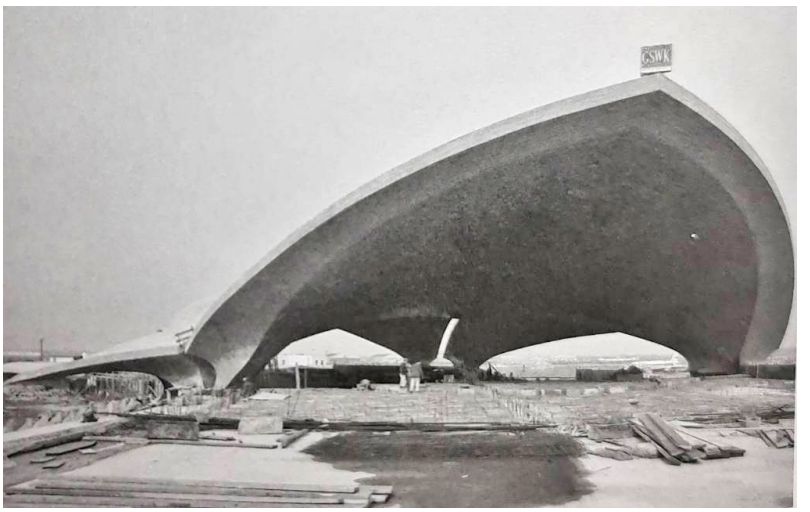

Figure 3 TWA Terminal: A metaphor of flight, Eero Saarinen. (Bell & Buckley, 2010, p.58)

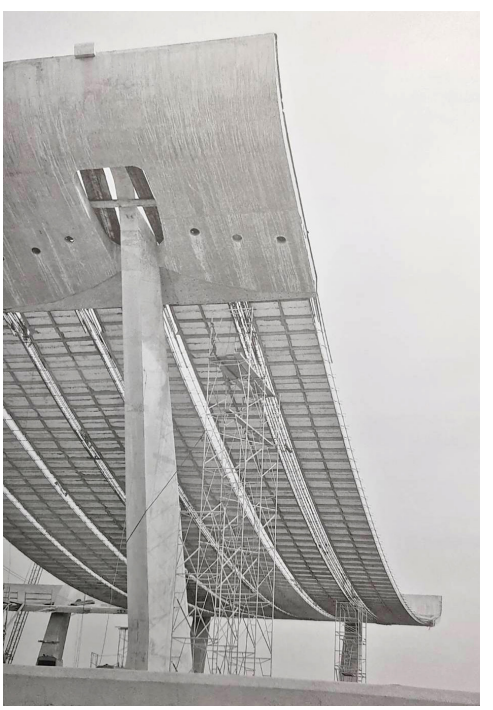

Figure 4 The concrete sheet of Washington Dulles International Airport under construction, Eero Saarinen. 1961. (Bell & Buckley, 2010, p.59)

The conference and book also consisted of the essays and knowledge distribution from famous architects and academic experts, such as “Pervasive Plasticity” by Detlef Mertins referred to the masterpiece work of Trans World Airline Terminal (TWA), New York (1956-62) designed by Eero Saarinen - great architect who built an architecture as a sculpture which the desire for formal plasticity, complexity, and alterity in the cultural imagination of organic forms. As well as “Model making Rangers: Form-Maker in Action at Eero Saarinen and Associates” by Pierluigi Serraino mentioned to Saarinen’s investigation of compound shapes, (formwork for the pouring of the sloped supports of Washington Dulles International Airport) Washington Dulles International Airport, Washington, D.C. (1961), whose realization so heavily relied on the formless malleability of concrete. Also, “Reinforced Concrete and Modern Brazilian Architecture” by Carlos Eduardo Comas described the Gymnasium of the Paulistano Athletic Club, by Paulo Nemdes da Rocha, Sao Paulo (1958) focused on the characteristic of concrete raw and weighty with rough-wood formwork as Brutalism style with crude severity to the structure rationalism characterize sport facilities building. The last essays “Notes on Weight and Weightlessness” by Steven Holl talked about the words “precast” the (new) centerpiece north wing of the landmarked building Higgins Hall at the Pratt Institute in Brooklyn, New York. The new structure comes with six exposed concrete columns and precast concrete. Then, a house in Martha’s Vineyard project (1984) “Exoskeleton” was a type of skeleton frame structure that was fell like weightless. Moreover, “Shotcrete”, “Tilt-Up”, “Form Textured”, “Cable Stay with Concrete Frame” also expressed the idea “The Weightlessness” in his building design process.

The contents presented within 4 parts. The first part starting with 6 projects (5 titles) which the best collaboration of architectural design, building technology, and engineering. The first project, “Horizontal Skyscraper: Continuous Garden”, Vanke Center, Chenzen, China was designed by Steven Holl. The building programs include apartments, hotel, and headquarters offices dealing with varies conditions such as, urban landscape, 8 concrete cores structure, the underside of the floating structure form, new potentials for sustainability and energy management, a new quality of protection against tsunamis, a new type of nature and urban life. The second project, “Concrete, or the Betrayal of Geometry”, Nanjing University Performing Arts Center, Nanjing, China and Tel Aviv Museum of Art, Tel Aviv, Israel were designed by Preston Scott Cohen. Both building presented a cause and resolve to dealing with design and construction method in diversely conditions. For examples, in Nanjing and Tel Aviv are the translation of curved surfaces to plate plane. Finally, the process of build form and structural technicality were not derived from geometric ideals but based in variables of material, production, and historically inherited perception. The third project, “Tower and Temperament”, O-14, Dubai, United Arab Emirate was designed by Jesse Reiser+Nanako Umemoto. The city’s efforts to create a sense of place which is the building’s skylines. The exoskeleton shell becomes the primary vertical and lateral structure of the building, allowing the column-free office slabs to span between it and minimal core. The graphically skin (shell) was generated by the idea of tectonics skin (the toad and the pyramid) as a symphony of disruption. The fourth project, “A Circular Journey”, Congregation Beth Sholom, San Francisco, California was designed by Stanley Saitowitz, Mason Walters, and Stephen Marusich. The sacred place in the city, an interesting structural challenge was substantial seismic-lateral forces generated by the mass of the bowl

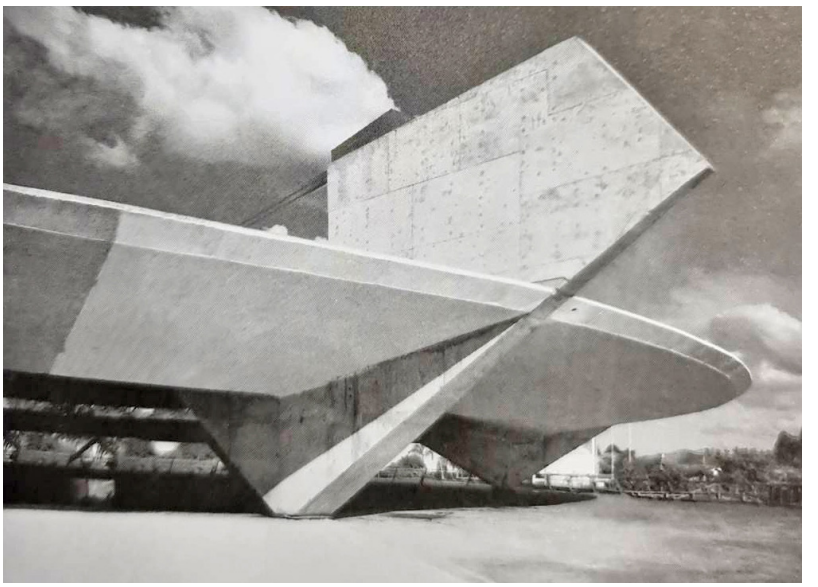

Figure 5 TWA Gymnasium of the Paulistano Athletic Club, Paulo Mendes da Rocha (Bell & Buckley, 2010, p.67)

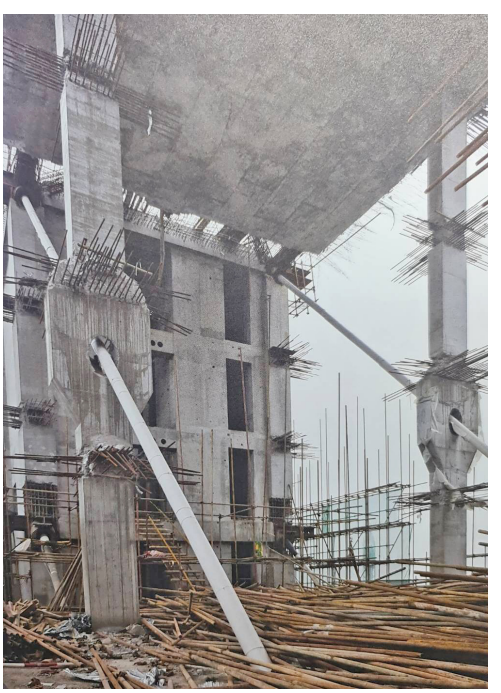

Figure 6 Vanke Headquarters, Steven Holl Architects. (Bell & Buckley, 2010, p.95)

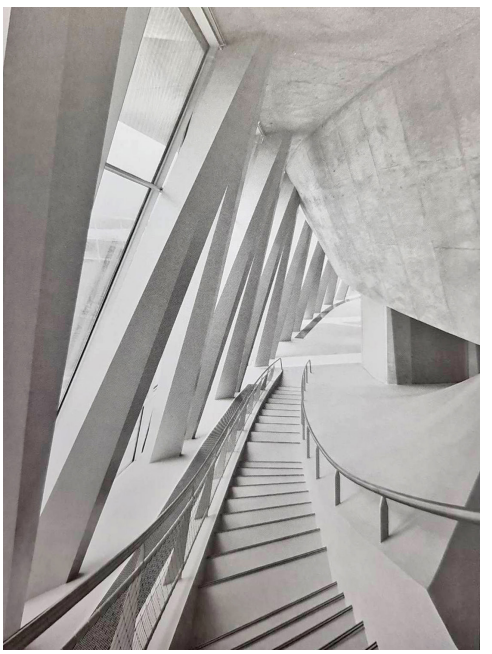

Figure 7 Interior of Mercedes - Benz Museum, UNStudio. (Bell & Buckley, 2010, p.142)

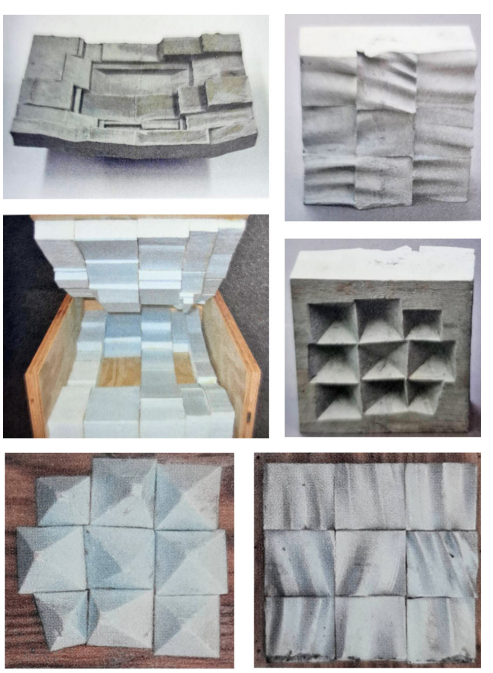

Figure 8 "Opportunity in Transition: The Reinventing of Concrete"- Experiments with concrete, Harvard Graduate School of Design, materials and construction class. (Bell & Buckley, 2010, p.235)

atop the pedestal and foundation. Two buildings are placed on the plinth, forming a courtyard in between. Then, the fifth project, "Sao Paulo: A Reinforced Context", Houses in Ribeirao Preto and Ubatuba, Sao Paulo, Brazil were designed by Angelo Bucci. In the city that concrete has spread everywhere, material has overcome insurmountable social, geographical, and economic barriers. Architects tried to make vertical construction on the high slope topography which is the strategies to deal with architectural style, site and urban context, and environmental laws.

The second part starting with 3 themes with projects in progress which the best collaboration of architectural design, building technology, engineering, and materials. The first theme is "Structural Engineering + Material Science" that demonstrated Mercedes Benz Museum by UNStudio, Stuttgart, Germany, 2006. Architecture exposed concrete surfaces and performed understanding and a mastery of the connection and the interrelation between materials, shape, structure, sustainability, surface, color, and light. (pic. 9). Moreover, other projects come with the topics of Magical Structuralism, From Wire Mesh to 3-D Textiles: Progress in New Reinforcements for Ferrocement and Thin-Cement Composites, Engineering in Cuba, Nanotechnology in Concrete, Ultra-High-Performance Concrete in Highway Transportation Infrastructure, and Form Over Mass: Light Concrete Structure Structures. The second theme is "Energy + Sustainability" which presented topics of Concrete and Sustainability Development, An Integrated Energy and Comfort Concept: Zollverein School of Management and Design, Essen, Germany, Green Concrete and Sustainable Construction: A Multiscale Approach, and The Hypergreen Path.

Finally, the third theme is “Cultural Effects”, that described the topics of Materialization of Concepts, The State of Concrete: An Investigation of Concrete in China, Living with Infrastructure, Opportunity in Transition: The Reinventing of Concrete, Implicit Performance: Exploring the Hybrid Condition, Solidifications, A Building and its Double, Cloaked Transparency: Land Port of Entry at Massena, New York, Artificial Natures / New Geographies, and Concrete Becoming Plastic, Then Graphic. Obviously, all contents showed the way how concrete was transformed into the construction in architecture and was explained in consequence of concrete technology.

Finally, the book indicates the strategies for the different ways to contrive the dialogue between solid and void as tangible and intangible, architecture and engineering as aesthetic and technology. The book also benefits for learning how to analyze an architecture with context of concrete technology, and how to synthesis or integration an architectural expression in the collaborate party. Not only in the architectural field, but also in others area have subjected.

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