OLIVIER OTTEVAERE

HOUSE ME TENDER

DESIGN FOLIO
FACULTY OF ARCHITECTURE
UNIVERSITY OF HONG KONG
Scaled model of 9-storey prototype of the House Me Tender project
Project Details

Designer: Olivier Ottevaere
Practice: Department of Architecture, the University of Hong Kong
Title: House Me Tender, open precast cell system for individualized housing in Hong Kong and China
Function: Housing
Location: Hong Kong and China
Practical Completion: Ongoing
Funding body: Redland Precast Limited (industry partner)
Area/Size: 9-storey prototype and 40-storey case study
Contributing partners: Redland Precast Limited (Precast and engineering consultants)
View of a corner detail from the 9-storey prototype presenting the idea of mass-customization
Summary of the Work and its Significance, Originality, and Rigor

In the context of Hong Kong’s longstanding tradition in precast construction, ‘House Me Tender’ expands on the use of concrete precast technology in high-rise construction, by pushing both industry and academic research in new directions.

It proposes a self-supporting structure made of precast volumes of different sizes and functions, from standardized main living spaces to customized extensions. A 9-storey prototype was first developed in detail with a team of professional engineers and precast experts as proof of concept to further
support the hypothetical development of a 40-storey high-rise, the dominant building type in Hong Kong.

Visual catalogues of precast plugins allow future residents to personalize parts and order straight from the factory according to the dimensions of living space. Protrusions of plug-in elements provide shaded and naturally ventilated exterior spaces, desirable in a subtropical environment.

The design scheme aims to offer individualization through mass production using reconfigurable formwork. Such flexibility also allows for apartment sizes to be adjusted over time in response to inhabitants’ needs. The project thus offers a clear
production/structural/tectonic and social agenda. Individualization, through mass production from reconfigurable formwork and adaptability of apartment sizes overtime, from recombination of modules, make up the overall identity of the building and ultimately accounts for its social agenda.

It has won one international award: Best Residential Future Project Award 2015, Architectural Review, London
The AR jury commented: “This proposal cleverly exploits the Hong Kong precast tradition. It envisages plug-in possibilities which would please tenants and enliven the local built environment.”

It has been exhibited at the 16th Venice
Biennale 2018 as part of the Hong Kong exhibition titled: "Vertical Fabric: Density in Landscape".

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It has been published in two peer-reviewed journals (Journal of Engineering Technology and HKIA Journal), presented at two international conferences (ACE 2014, AAE 2016) and lectured to professional bodies (HKIA, HKIE).
Duplex units study of precast volumes made of different sizes and functions
Duplex units study of precast volumes made of different sizes and functions

Above: visual catalogue of individualized parts
Below: cross-section showing their environmental integration as extensions of living spaces
40-storey prototype showing the hierarchy of different precast components (from standardized to customized volumes) and various color-coded types of living units.
Originality

From the standpoint of building technology, the use of precast construction elements in residential architecture in Hong Kong is limited to two-dimensional elements such as semi-precast slabs, partition walls, façade plug-ins, staircases and volumetric toilet.

The R&D project introduction of different size precast volumes, some standardized others mass-customized speeds up the construction process on site with less pollution and guarantees better building quality by being manufactured in a controlled environment, i.e. precast factories, while maintaining efficient vis-a-vis current models.
From a social perspective, the project is original in the way its offers a bottom up approach in the realization of a building through the mass-customization of volumetric precast elements. It provides a visual catalogue of variables from which future residents are able to choose straight from the industrial chain of production to customize their living spaces (i.e. types of openings, outdoor balcony, planters, location of glass enclosure, etc.), which gives an unpredictable form to the building.

The aggregation of different sized volumes allows for various types of apartment combinations that are flexible to various social classes and adaptable to inhabitants over time, as households grow and shrink generationally.
Environmentally, these units provide better living and spatial qualities, i.e. units organized in duplexes of different orientations, by reinstating outdoor living opportunities into Hong Kong, a dense sub-tropical city in need of new cooling strategies through passive architectural design.

Study of different sizes of unit types and their locations in plan
Rigor

The project was developed in collaboration with a team of professionals, including architects, structural engineers, and precast material experts (and a precast company). The collaboration originated with the need for local professional expertise in precast technology to advance the research & development of ‘House Me Tender’.

One of the main hurdles with precast technology is the guarantee of mechanical connectivity between elements against stress from natural disasters, such as typhoon and earthquakes, e.g. wind and seismic loads.

Through an iterative process of structural data analyses with the project
team, the implementation of proper load paths, moment connections details and steel reinforcement were analyzed, calculated and simulated (via various engineering software) to create a process of architectural design efficient as possible, where design development responded directly to engineering feedback.

A 9-storey prototype was first thoroughly detailed for construction to test the feasibility of the concept before a 40-storey prototype was later achieved in response to Hong Kong’s main building type. The project is at a stage where a complete three-storey mockup is being developed to be manufactured at the precast plant as proof of concept to the industry at large and to the building department.
Structural analysis simulation for one standardized beam box (volumetric precast element)
Calculations of accumulated compressive loads on the 9-storey prototype
Structural feedback on load paths of initial design proposal

Member internal force with floor level: box unit type 1

Member internal force with floor level: box unit type 2
Load paths diagram of initial design proposal
Revised structural calculations on load paths of adjusted design proposal
Adjusted design proposal of load paths based on structural feedback
Study and detailing of moment connection of precast parts to resist wind and seismic forces
Study of structural integrity and hierarchy of the various precast components
Significance

The project’s significance can be measured in terms of its overall design quality, its unique collaborative origins, and its impact on governmental policy.

The project predates the Hong Kong government’s recent initiative to promote innovation in technology and construction practices by encouraging a shift from planar (two-dimensional) to volumetric (three-dimensional) concrete precast construction for housing.

In addition, these precast volumes are now allowed to perform structurally, pending code amendments from the building department. ‘House Me Tender’ anticipated these shifts and represents a ground-breaking pilot project that has
the potential to inform ongoing and future policy considerations.

As a form of precast technology, the project’s three-dimensional framework is composed of interchangeable parts that support a range of customized, precast outcomes. This was an early project objective achieved without compromising the supply factory’s daily production cycle.

From a professional perspective, the project’s significance is underscored by recognition from the Architectural Review in London by being awarded Best Future Residential Project 2015 among 39 selected entries worldwide in the residential category.
View of the 9-storey prototype in Hong Kong context
Interior views of duplex living units showing some of the spatial characteristics
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nterior views of duplex living units showing some of the spatial characteristics. Key cross-section of 9-storey prototype showing in-door/outdoor relationships and interior double-height living spaces.
Dissemination and Evidence of Peer Review

Awards:

Description:
“The Architectural Review is at the heart of global architecture and the awards programme seeks out transformative, leading edge projects from around the world. Providing a respected and critically authoritative global platform for the best new buildings, AR Awards represent the ultimate mark of distinction.”

“These Awards recognize and celebrate the role of design in the creation of
successful development, which include the contribution made to the public realm as well as the quality of proposed buildings... Once again they demonstrate a rich mix of approaches and ambitions with 220 entries from architects in 28 countries, most notably the UK, China, Turkey and the United States.”

‘House me Tender’ received first prize among 39 selected projects in the Residential category.

Jury:  
Paul Finch OBE, Jury Chair, Director of the World Architecture Festival and Editorial Director of the Architectural Review and Architect’s Journal; Christina Seilern of Studio Seilern; Peter Stewart of architecture and planning consultancy PSCPA;
architect/developer Roger Zogolovitch of Lake Estates; Dr Sutherland Lyall, critic.

Comments by the Jury:
“This proposal cleverly exploits the Hong Kong precast tradition. It envisages plug-in possibilities which would please tenants and enliven the local built environment.”

Exhibitions:
- Model and drawings presentation of the project as part of the exhibition Vertical Fabric: Density in Landscape for the 16th Venice Biennale Architecture Exhibition, Hong Kong Pavilion, June-November, 2018

- “House me Tender”, in 2020: Housing China Exhibition, The University of Hong Kong, Hong Kong, May, 2013
Publications:


-“Hong Kong housing design wins best residential project award”, Perspective Global, (August 2015), online write-up.
Peer-reviewed conference papers:

-Ottevaere O. “Liquid State and Concrete Uncertainties”, in Risk Panel, International Research Based Education 2016¹, conference in celebration of the 175th Anniversary of the Bartlett School of Architecture, University College London (UCL) and in collaboration with the Association of Architectural Educators (AAE) and the Architectural Review (AR), London, England, 2016.

Lectures:

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-“House me Tender, Total Precast Cell Systems for Mass Customized Housing”, Invited Lecture for Archi-Talks Series, Hong Kong Architecture Center, November, 2013.

-“House me Tender; Total precast cell systems for mass customized housing in China”, Keynote Lecture at the Hong Kong Institute of Architects (HKIA), Continuing Professional Development (CPD) seminar, Hong Kong, January, 2013.

-“Seminar on a review of the use of precast construction in Hong Kong since 1970s and examples of innovative design for future modulated precast projects”, Keynote Lecture at The Hong Kong Institution of Engineers (HKIE), Continuing Professional Development
(CDP) seminar, Hong Kong, May, 2013.


“Prototypes for mass customized housing using precast volumetric system”, Affordable Housing Research Network (AHRN), Invited Speaker for the Launching Symposium Faculty of Architecture, the University of Hong Kong, November, 2012.

Teaching:
- Master of Architecture design studio
(spring 2018) at the University of Hong Kong
Title: House me Tender, Volumetric precast for individualized living in Hong Kong.

Research studio objective:
To seek to implement concepts of mass-customization in precast housing that offers greater flexibility and adaptability over time in accommodating various types of living units for various social needs and to ultimately challenge the supported tendency of segregating housing types for specific social groups.

From the analysis and transformation of the building systems of these housing types, the studio put forward new three-dimensional precast prototypes that reassert the individual as the main protagonist for the making of their own living environment. This was investigated
through ideas of mass customization at the factory line and through assembly scenarios of precast volumetric units.
WINNER
HOUSE ME TENDER, NEW TERRITORIES, HONG KONG
DOUBLE(0)

This is a self-supporting structure made of precast concrete volumes of different sizes and functions which has been proof tested with a nine-storey construction. Intended as a better way of doing the standard 40-storey Hong Kong high-rise, these precast living and sleeping units, based on the user’s needs, complemented by bathroom and kitchen units, plug into a pre-built framework. ‘This proposal cleverly exploits the Hong Kong precast tradition,’ said the judges. ‘It envisages plug-in possibilities which would please tenants and enliven the local built environment.’
Bibliography


-C.S. Poon, Lara Jaillon (Department of Civil and Structural Engineering, The Hong Kong Polytechnic University): “A Guide for Minimizing Construction
and Demolition Waste at the Design Stage”, The Hong Kong Polytechnic University, February 2002.


- Wong, W M, Raymond (2012). Application of Precast and
Prefabricated Techniques in the Construction of High-rise Structures under dense City Environment in HK, 29-39, 127-142.
Appendix

Precast examples of bay windows used for Hong Kong housing which House Me Tender refers to as existing technology
Examples of current steel moulds technology to create volumetric bay windows on a daily production cycle.
Axonometric view showing hierarchy of all integrated parts of the 9-storey prototype
Example of visual catalogue of a mass-customized component with varying window types, skylight, planter, balcony, Et. al.
The Department of Architecture educates students in an active culture of service, scholarship and invention. Uniquely situated at the crossroads of China and global influence, the Department takes the approach that design is best explored from a sophisticated understanding of both. With a multidisciplinary curriculum emphasizing technology, history and culture, students gain broad knowledge and skills in the management of the environmental, social, and aesthetic challenges of contemporary architectural practice. With opportunities for design workshops, international exchanges, and study travel, graduates of the Department of Architecture are well prepared for contribution to both international and local communities of architects and designers.