OLIVIER OTTEVAERE

NEW ORDERS
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Columns #1 to #3 of New Orders exhibited as part of the Bi-City Biennale of Urbanism/Architecture 2015, Hong Kong
Project Details

Designer: Olivier Ottevaere  
Practice: Department of Architecture, the University of Hong Kong  
Title: New Orders, in search of a new point-block diagram for Hong Kong  
Function: Columns prototypes are scaled at 1:1, Speculative point-block towers at scale 1to100  
Location: Hong Kong, with potential international applications
Practical Completion: 2016
Funding body: Seed Project Grant from the University of Hong Kong
Budget: 100,000 HKD
Area/Size: 9 concrete columns of 180cm high by 40cm wide
Summary of the Work and its Significance, Originality, and Rigor

The project investigates a series of alternative structures for housing through a design-research prototyping process. It proposes a new method of designing and building vertical architecture, which in turn has the potential to transform how interior and exterior space is organized, programs arranged, structures articulated, and circulation defined.

The series explores nine specific massing and structural organizations, each at 1:1 scale, which through analytical diagrams are further architecturally tested as speculative towers for urban high density living at
1:100 scale. Nine proto-structures were initially conceived and realized as cast-concrete columns.

At 1:1 scale, concrete as process rather than just concrete as material sets the main design-research methodology. The value of working at 1:1 scale lies in real-time material computing, in the empirical feedback from active forces of materials.

This project emerged through a series of trial and error experiments with specific material properties, particularly concrete. Studies of the transformation from liquid to solid led to the development of new formwork techniques that responded more sensitively to the particular pressures of the material, its fluidity, and continuous transition between tectonic
Design research and analysis was informed by the work of early structural rationalists such as Felix Candela, Pier Luigi Nervi, Heinz Isler and Robert Maillart, all of whom worked to develop specific structural systems for improved performance with reinforced concrete. New Orders was inspired in part through this work, though it departs from precedents in its direct response to the high-rise urban context of Hong Kong.

The experimental methods of design and casting tested in New Orders were further realized in several subsequent designs, including Smoke Shafts, a series of ventilation chimneys fabricated in a precast factory in Dongguan and
incorporated into a mixed-use building project in Shenzhen in 2018, and Casa Trevo, a cast-in-place concrete house (of an area of 250 square meters) under construction in Lisbon, Portugal and due to be completed in summer 2019.

It has been presented at 4 international conferences (ICSA 2016, ACSA 2016, ACE 2016, AAE 2016); selected and exhibited at the Hong Kong-Shenzhen Biennale of Urbanism and Architecture; and been published in two peer reviewed journals.

It has received positive reviews from conferences proceedings: “Pertinent research-based learning practice, work of a high standard” (AAE conference, The Bartlett, UCL), “Global evaluation
Above: Smoke Shaft concrete prototype
Below: Casa Trevo under construction
The project's originality lies in the processual use of concrete, concrete as process rather than just as material. Manifested by the columns' physical presence, their arrival to form is informed by the way they were cast via unique formwork prototyping in a workshop/laboratory environment. They each propose a heterogeneous materiality in concrete which is facilitated by devising formworks made of a combination of hard and soft materials (i.e. plywood and fabric sheets), in order to tease out notions of responsiveness between the moulds and the liquid concrete material before hardening.

Hands-on prototyping exercises were crucial to the experimental phase of the
Originality

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project, and resulted in the production of a range of invented formwork techniques that are more closely in tune to the concrete properties and its associated forces such liquid to solid state, mass and pressure. This in turn offers greater continuity and fluidity between architectural elements (i.e. column/wall/slab) that cannot be normally accomplished by conventional formworks.

The formwork techniques helped to generate a specific expertise that became important in the project’s subsequent stages of production. This accumulated knowledge and expertise became a resourceful grammar of procedures when addressing larger scale projects, which brought an extended
lifeline to formwork design beyond the project itself:
In the Smoke Shafts project, for example, formwork was tested, revised, and prototyped to determine qualities of responsiveness before proceeding to the manufacturing of the chimneys at a 1:1 industrial scale, in a precast factory context, located in the Pearl River Delta.

In Casa Trevo, some of the formwork techniques were transferred to a general contractor as a form of knowledge exchange, and a means to test further their ability in shifting scales, while others informed the design process for the house’s spatial organization. A final aspect of the concrete columns’ originality is their speculative nature as vertical living organizations.
Catalogue of formwork prototypes for New Orders, testing a range of techniques and materials
Catalogue of formwork prototypes for New Orders, testing a range of techniques and materials
Incremental and iterative concrete tests made during the prototyping process of the project.
Incremental and iterative concrete tests made during the prototyping process of the project.
Rigor

The incremental, empirical, and cyclical prototyping process at the core of this project, inform its overall rigor. The engagement with casting challenges the separation of design from construction in productive and potentially original ways.

Their development constantly oscillates between two scales of investigation, ranging from material experimentations to spatial propositions:

- At 1:1, the columns are exercises in formwork prototypes.
- At 1:100, they are massing studies, speculative of point-block towers (Hong Kong’s dominant building type).

Each column proposes a specific yet irregular form of structure that
tailors flexibly to varied types of living organizations. As scaled towers, they offer alternative proposals to Hong Kong’s repetitive building model, which tend to be restricted vertically to repetitions of the same scales, building materials, and living spaces.

As a starting point, the design of each column draws from the analysis of seminal work of engineers and architects -- ‘structural mavericks’-- who pushed the limits of building with reinforced concrete, a novel material then. Column 1 engages with the work of Felix Candela and his rule-based Hypar geometry for concrete shells (1950’s), Column 8 was inspired in part by Pier Luigi Nervi’s columns of changing profiles (1960’s), while Colume 7 was influenced by Robert Maillart’s mushroom columns (1910’s).
Upon the completion of the casting process, each column’s material and formal language was revisited and transformed into a different conceptual scale, i.e. new towers for vertical living. To further push this research into the realm of high-rise construction, structural and environmental analysis was conducted of the minimum solar radiation and maximum natural ventilation exposure for each conceptual tower in a subtropical climate like Hong Kong. Diagrams of potential living units also serve as criteria to be used in the evaluation and verification of the design research involved.
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‘Structural Mavericks’ and their key work used as references in New Orders
Diagram studies of units organizations and living types for each tower
Examples of analytical drawings for the design-research of the columns
Examples of analytical drawings for the design-research of the columns
Series of nine columns and their precedents

COL_1

SHELLING FLUTING
E. Torroja
F. Candela
H. Isler

COL_2

BRANCHING CORRUGATING
E. Dieste
B. Golberg

COL_3

BUNDLING WEDGING
Housing Authority Housing Society

COL_4

HOLLOWING CHANNELING
M. Fisac
Tan Cheng Siong

COL_5

AGENCY
Series of nine columns and their precedents
New Orders columns in its intended urban context (Hong Kong)
New Orders columns in its intended urban context
(Hong Kong)
Significance

The main significance originating from the project is the proposition of an alternative design-research methodology for practice in architecture as contribution to knowledge.

Besides the concrete columns having been disseminated through exhibition and publications, the project key impact lays in the originality of its resulting design methodology, further tested at incremental sizes of projects (i.e. Smoke shafts and House under construction).

The methodology has the potential to inform the realization of larger-scaled projects. With materials that transform from one material state into another, there are both challenges and opportunities for new design approaches that accommodate these changes over time. Space is prototyped via the gestalt of the materials, rather than relying on a schematic representation of space. The design research method is situated in the gap between material-based practices concerned with the experimentation with materials through prototyping small size objects and practices that focus on the built conceptualization of space, through methods of design representation. The proposed prototyping methodology oscillates between [gestaltic] material experimentation and schematic representation, and reinvigorates the design process to go beyond visual, schematic representation. In working this way, the ultimate ambition is to offer an augmented spatial experience of a built project by increasing...
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The proposed prototyping methodology oscillates between [gestaltic] material experimentation and schematic representation, and reinvigorates the design process to go beyond visual, schematic representation. In working this way, the ultimate ambition is to offer an augmented spatial experience of a built project by increasing
the dialogue between its material forces and its conception of space; from material to spatial responsiveness (materials talking to an idea of space).

Catalogue of Smoke Shafts made of different combinations of few types of mass-produced elements
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Initial prototyping test of Smoke Shaft at the precast factory as proof of concept.

Catalogue of Smoke Shafts made of different combinations of few types of mass-produced elements.
Columns studies relevant to the design research of the House project (Casa Trevo)
Casa Trevo under construction in Lisbon, Portugal and its relation to the columns' prototypes of New Orders.
Dissemination and Evidence of Peer Review

Exhibitions:
- “New Orders”, selected as part of the Bi-City Biennale of Urbanism/Architecture2015, Hong Kong, curated by Christine Hawley, Professor and Former Head, Bartlett, University College London.

- “New Orders”, Architectural Association Visiting School, Shanghai 10th Anniversary, Shanghai, China, 2016

Publications:

**Citation:**
- O. Ottevaere interviewed in “Hong Kong in 2050: artificial islands, new look apartment buildings and ‘urban living rooms’ says architecture forum”, by Peta Tomlinson, in Lifestyle section, South China Morning Post, Hong Kong, 09 December 2015.

**Conferences:**
- Ottevaere O. “New Orders, In search of a new point-block diagram for Hong


-Ottevaere O. “New Orders, In search of a new point-block diagram for Hong Kong, 4th Annual International Conference on Architecture and Civil
Engineering (ACE 2016), Singapore, April, 2016.

-Ottevaere O. “Liquid States and Concrete Uncertainties”, in Risk Panel, International Research Based Education 2016, 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, April, 2016.

**Symposium:**
-Ottevaere O., invited speaker “Concrete Structural Prototypes for High Density Living”, in Changes in Industrial Paradigm, Architectural Association Visiting School Symposium, Shanghai,
Lectures:
- “Design through prototyping”, Invited Public Lecture at Zhejiang University, Faculty of Architecture, Hangzhou, China, May, 2018
- “Concrete as Process”, Invited Speaker at American Institute of Architects (AIA) Hong Kong Chapter for the Advanced Technology Lecture Series: Technology and Material, Continuing Professional Development (CDP) seminar, Hong Kong, April, 2016
Beijing, China, November, 2015

-“Liquid State and Concrete Uncertainties”, Invited Speaker at the Practice Research Symposium (PRS Asia), Royal Melbourne Institute of Technology (RMIT), Ho Chi Minh City, Vietnam, April, 2015.

-“New Orders, Structure-Materiality-Procedures”, Invited Public Lecture at the Shih Chien University, College of Design, Department of Architecture, Taipei, Taiwan, December, 2014

-“Formwork”, Concrete Matters Symposium, Invited Speaker, Fall 2014 Public lecture series, The University of Hong Kong, Faculty of Architecture, November, 2014
Teaching:
- Invited visiting professor (prototyping studio titled ‘Concrete Approximations’), Zhejiang University, Faculty of Architecture, Hangzhou, China, fall 2018

Students projects examples of teaching in prototyping modular concrete screens
Modular concrete screens by students informed by environmental analysis (solar radiation and air flow)
Bibliography

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.