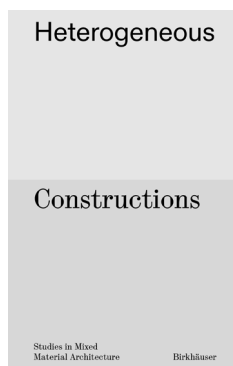


ZORANA PROTIĆ

## HETEROGENEOUS CONSTRUCTIONS STUDIES IN MIXED MATERIAL ARCHITECTURE



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Project Leads: Aaron Forrest, Brett Schneider, Yasmin Vobis  
Graphic Design: Andrew LeClair  
Prototypes Photography: Naho Kubota

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Heterogeneous Constructions can be read as a manifesto opposing established building norms, advocating an open, flexible framework of heterogeneity that embraces the rawness and imperfection of architectural appearance. This research introduces the idea of offering a new perspective on the heterogeneity of construction, in which each material constitutes an inseparable segment of the whole, with multiple roles in relation to other materials and to the system as a unified entity. A collage of several different materials has a greater impact than the sum of individual characteristics of each material on its own. At the same time, the material becomes an inseparable component of the structure, acting as the building's envelope while simultaneously asserting itself as the aesthetic identity of the whole.

The idea for this thesis on the heterogeneity of structure emerged as a response to the homogeneous approach to constructing layered systems, whereby each layer plays a distinct role within the whole. The monofunctionality of each structural layer dates back to the twentieth century, taking the form of structural and aesthetic paradigms that dominated practice and had a profound impact on architectural discourse. On the surface, the final layer of the construction does not reveal anything about the structure it encloses; rather, it conceals it, creating a fictional image of the building. As a result, contextual conditions and cultural differences are overlooked, leading to problematic uniformity and regulation. In this approach, houses – despite being located in geographically and climatically diverse regions – are built according to identical construction standards and conventional notions of uniformity.

The research is structured around three methodological approaches: analysis, essay, and prototyping. Two key chapters form the backbone of this study: one provides an analysis of relevant case studies, while the other details the implementation of full-scale structural prototypes, developed by students from UC Berkeley, the Harvard Graduate School of Design, and the Rhode Island School of Design. These efforts directly contribute to the

study's overarching objectives. The fifteen selected examples of heterogeneous constructions span a wide historical range, from Mesopotamian and vernacular architecture to the Industrial Revolution and contemporary experimental practices. They are typologically diverse, encompassing residential, social, and industrial structures.

All case studies were analysed and catalogued with basic data on location, purpose, and construction date, along with a representative photograph and a concise explanation of their heterogeneity. What makes this analysis particularly valuable is the use of analytical drawings, in which each material group is assigned a distinct colour. Each structure is represented through three linear drawings, as well as 2D and mathematically precise axonometric projections. This part of the research resulted in the identification of six categories of structures, classified by materials and construction types: *Stacks*, *Sandwiches*, *Fills*, *Wraps*, *Collages*, and *Scaffolds*.

The second part of the research involved hands-on work with an experimental model that collages simple, readily available consumer construction materials into spatial installations, each illustrating the logic behind one of the six material groups. The goal of this practical work is not to construct fully realized static models of columns, walls, or ceilings, but to explore the fundamental principles that govern the connections between different materials and elements in creating stable structures. In this way, the combination of drawings and the immediacy of building materials in dialogue serves as a key didactic tool for both theoretical and empirical investigations into how systems operate and how individual elements interact.

The very titles of the critical in-depth essays – *Making Do*, *Category Errors*, *The Difficult Imperfect Whole*, *Mixed Media*, *Grid*, *Machine*, *Mud*, *Work*, *Air*, and *How to Build Heterogeneously* – reflect the breadth of this research in interpreting heterogeneity. The authors, all of whom, in addition to their practical work, teach at one of the three aforementioned schools, highlight several key experimental models of heterogeneity:

19<sup>th</sup>-century constructions such as the Manier Chocolate Factory in France (1871-1872); 20<sup>th</sup>-century modernism, exemplified by Mies van der Rohe's Barcelona Pavilion (1929); and contemporary 21<sup>st</sup>-century design practices, represented by Belgian architects Jan De Vlyder and Inge Vinck, and Swiss architect Roger Boltshauser.

These essays explore heterogeneity from multiple perspectives: material, structural, formal, cultural, economic, and ecological. Heterogeneous constructions present an unconventional approach in which the act of construction becomes an inseparable part of the design process itself. This approach embodies what might be termed "Inventive Pragmatism". No single material can fully satisfy all requirements. All materials, whether organic or artificial, inevitably wear out, age, and deteriorate over time. In terms of materials, only the amount absolutely necessary is used.

All processes are considered acceptable, from reconstruction and redefinition to the construction of entirely new buildings. The heterogeneous approach integrates established construction practices with contemporary technologies, utilizing available materials while adhering to construction norms and standards. However, standard procedures and static calculations do not apply to these structures. Despite this, they continue to be determined, verified, and empirically proven, as they have been throughout history. Ultimately, the beauty of these buildings lies precisely in their incompleteness and imperfections.

The book makes a substantial contribution to the advancement of both architectural theory and professional practice. One of its key messages is that practicing architects must rethink and innovate construction, becoming more actively engaged in the building process itself. Architecture, in this context, should be viewed as a permanently open process. At the same time, the academic community must foster open discourse on heterogeneity, preparing for a different and better world.