

Recensioni

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**Sistemi voltati complessi:
geometria, disegno,
costruzione**

**Complex Vaulted Systems:
Geometry, Design, Construction**

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After attending the “Corso di Eccellenza” in 2019, a course included in the Dottorato in Beni architettonici e paesaggistici of the Dipartimento di Architettura e Design at the Scuola di Dottorato del Politecnico di Torino, this volume, entitled *Sistemi voltati complessi: geometria, disegno, costruzione* (*Complex Vaulted Systems: Geometry, Design, Construction*), was published by Aracne.

The book becomes an important reference for the specific topic with which the research deals: the analysis of the geometric systems that govern the design and construction of vaults. This study helps to simplify and understand the vaults essence and internal structure, whose complexity and virtuosity have always astonished the spectator.

The content of the book has been organized in the same way as the structure of the specialized course where it all started. It begins with a preface by Emanuele Romeo, Director of the Dottorato di Ricerca in Beni Architettonici e Paesaggistici of the Politecnico di Torino. This chapter focuses on the real aims of the university research and its essential reversion to society, especially on historical heritage.

In an initial section, the coordinators of the publication reflect on the motive and relevance of the research carried out. Roberta Spallone explains the major reasons for undertaking the research. This should be the starting point for

any academic work. These reasons are the appropriate disciplinary framework within the area of architectural design and the interest and novelty of the subject addressed.

Roberta sets out the transdisciplinary nature of this field of study, which involves so different scientific areas such as the history of architecture and building construction, restoration, current construction techniques of historical buildings, drawing and surveying of historical architecture and even geometry and the latest generation of digital graphic techniques.

This issue sufficiently justifies the relevance of the subject to be addressed and not so much because its novelty. The study and drawing of historical architecture are not new, but the methods that infographic advances now allow us to discover novelties in elements and buildings that have been very well studied.

Marco Vitali, for his part, discusses in detail the specific study of the vaults of civil architecture of the Baroque period in Piedmont. This work is the result of two-decade teamwork research.

In the baroque sacred space, extensive developments are built for its covering, motivated fundamentally by the appearance of the new paradigm of the ‘central plan’, which constitutes a large part of these models. On this basis, the author proposes a parallel investigation applied to the space of civil architecture, not so frequently analyzed in

the field of the historiography of monumental architecture and restoration. Starting with the survey plans, the author models in three dimensions and configures an augmented reality of the spaces analyzed, providing interesting diagrams in which geometry and drawing make a decisive contribution to clarifying the complex compositional methods of Baroque architects.

In the first part of the publication, which is the second content block of contributions to the research theme, there are five chapters written by as many authors. All of them are related to the main theme of the book: the complex vaults.

In his section, Andrea Giordano analyzes the geometric characteristics of vaulted systems and proposes a new reading of the complex mechanisms of stone stereotomy through the use of the new tools of three-dimensional digital drawing. He contributes his own idea of using the Visual Programming Language (VPL) to create a 'stereotomic alphabet'. This contribution is illustrated by three-dimensional models of the proposals from some important treatises on stereotomy.

José Calvo-López analyzes the geometric problems that occurred during the pre-industrial era when carving the stone blocks that made up the vaults. He shows the inevitable relationship with the development of geometry for their correct resolution. The rope, as the basis of the *in situ* outlines, becomes a simple but essential tool for the stonemason. The illustrations that accompany the chapter make it easy to read and understand.

Carlo Bianchini studies the application of one of the most important treatises in the seventeenth century. Two of these treatises—mathematics and architecture—propose the novel 'con-

struction' of a kind of 'virtual treatise'. Ana López-Mozo proposes a study on asymmetrical Gothic vaults, which the author defines and determines by firstly taking into account the general classification of the elements that make up the Gothic vault and then the characterization of the particular type she intends to analyze. The author distinguishes between the two systems that make up the Gothic vaults: nerves and plementery. With these systems, a very versatile mechanism is constituted to achieve the covering of spaces with any geometry, even irregular. The author adds some photographs to her discussion showing details of existing vaults in different parts of Europe that help you to understand her arguments. It ends with an interesting comparative diagram with the several examples studied.

Finally, Pablo Navarro-Camallonga studies the vaulted systems of carved stone in the framework of the ancient Kingdom of Valencia in the 15th century. The author himself states it is a part of his PhD work. It is a type of vault that precisely differs from those analyzed by Ana López-Mozo, in which the placement of the voussoirs is continuous and its particular stereotomy is in fact what shapes the geometry of the vault finally built. The author bases his work on formal analysis, through historical documentation, and on the metric analysis of the built works. Photographs of the analyzed elements, photogrammetric surveys and geometric analyses are included to always support the author's thesis.

In the second and final part of the book, six graduates' contributions have been chosen among those participating in the Symposium. All contributions share the same topic: vaulted structures and address various issues

of research interest: from brick vaults, very frequent in Mediterranean architecture, to more singular and unpublished, such as vaults in Ancient Egyptian architecture. Essential issues are dealt with to complete the whole book, for instance the study of the nomenclature of vaulted systems; more specific studies on Guarini's treatises, probably influenced by Bianchini's aforementioned lectures; a study of comparative analysis of three specific points in the Mediterranean area referring to the use and construction of vaults: Mallorca, Valencia and Palermo; and finally a curious study about the vaults known as "Swallow dome", typical in the Caucasus area. The author analyzes it and then compares the formal system with the dome in the Chapel of the Holy Shroud in Turin. This high point may not be a coincidence and perhaps it is a tribute to the University where the research was carried out.

Finally, the book closes with a postface by Concha López-González who is a professor at the Polytechnic University of Valencia. She outlines the essential relationship between university research and society, just as Roberta Spallone had explained in the preface. A book itself is the ultimate expression of this relationship. It makes the results of research available to society in a compiled, synchronous and attractive way, confronting the current inflation of indexed articles, which the vertiginous university competition frequently shows us, being finally aimed at a much more specialized readers.

This fantastic book fulfils all the requirements of a good research. First, the book deals with a relevant subject: the vaulted systems in architecture. Secondly, it makes an innovative contribution to the analysis or the results. The continuous use of new technologies helps

us to understand the enormous complexity of vault constructions, their geometries and stereometries. Making a computer three-dimensional model

seems to be complex in this technological 21st century, although medieval masters were able to build cathedrals just by using their tools and stone tra-

cings. Isn't it amazing? And thirdly, their contribution to knowledge and society.

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