

Preface

During the end of the nineteenth and the beginning of the twentieth centuries, the centers of many urban areas suffered important transformations that were responsible for the demolition of a considerable number of constructions, giving place to wider open areas and avenues. Also, new agglomerates of buildings were created outside the city centers, leading to the abandon and degradation of a considerable number of constructions. In reality, the way constructions are understood has modified over the years, following the changes in peoples' lifestyle and demands. In some cases this made people to move to new and modern areas, in other cases to intervene on the existing buildings, or to demolish and substitute them with new ones.

Intervening on an old building is, therefore, a matter that concerns social, economic, and cultural issues, which may assume different weights depending on the available funding, the knowledge and sensibility of the owners and technicians involved, the location and importance of the construction, the perspective of the authorities, among many other issues. The gathering of these data will constrain the procedures and techniques involved on the intervention of an old building, which, however, should always aim, in parallel with other concerns, the accomplishment of structural safety and the usage or service requirements, but without ignoring the particular value of the building.

Unfortunately, in the past many interventions on existent buildings have been inadequate in terms of the protection of their materials and constructive systems. An extreme, but paradigmatic example is the demolishment and substitution of the whole interior of the buildings, substituting it with new structural systems, just preserving the façades. Such types of interventions are quite invasive and ignore the constructive typologies and techniques that characterize the buildings. Moreover, they may introduce different materials and systems, not always sufficiently tested and known and that can create physical, chemical, and structural incompatibilities with those already existing in the buildings. In some countries, the lack of specific codes for the rehabilitation, enforcing the use of codes aimed for the design of new constructions, has strongly contributed to these results.

Actually, there are international recommendations and charts describing principles that should be respected when intervening on old constructions. They refer to some characteristics the interventions should aim; in particular, they should be low intrusive, reversible, and compatible with the preexistences. Although they

are not always easy or possible to be fully respected, a growing effort has been made to converge to interventions closer to these principles, which can be only achieved with a proper knowledge of the materials, structural systems, and construction techniques used in the constructions. In fact, the lack of knowledge is, probably, the most important aspect that leads to the disrespect of the built heritage. It leads to the lack of confidence on old materials and induces technicians to look to old constructions not as something capable of sustaining the current needs of people, providing that proper interventions are made, but as something meant to be replaced by a new construction made of materials they know and rely on better, namely concrete and steel. Such perception often makes technicians to propose solutions on old constructions that lead to invasive and barely reversible interventions, and eventually to the near total destruction of the existing building.

Following this purpose, the book highlights the most important aspects involved in the characterization and understanding of the behavior of the most common structural systems and materials that are part of old constructions. It starts with the description of the structural systems of traditional buildings, referring to the most common structural elements and to their influence on the overall behavior of the construction. The subsequent chapters go more in detail in the structural elements and characterize, separately, the main elements that constitute an old building, namely: masonry walls either made of earth, bricks, or stone, timber and composite walls made of timber and infill material, and timber structural floors and roofs. In the book is also included a chapter dedicated to reinforced concrete structures, probably the most important structural material that, by the beginning of the twentieth century, progressively substituted the previous materials, being used in many constructions from that period on. Each of these chapters describes, with different levels of detailing, the materials, the construction procedures, the mechanical properties, the mechanical behavior, the damage patterns, and the most probable collapse mechanisms. Some of the chapters also present common or pioneering intervention measures applied to the repair and/or strengthening of structural elements, referring to their applicability and expected results.

To conclude, the editors believe that the book gives important information about the characterization of old buildings, helping the reader to have a better understanding of the behavior of these constructions and facilitating information that may help in the development of more precise and correct interventions, more in agreement with their original characteristics and cultural value.

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