

Statische Beurteilung historischer Tragwerke

Band 1: Mauerwerkskonstruktionen

[Structural assessment of historical structures. Volume 1: Masonry construction]

by Stefan Holzer

Berlin: Ernst und Sohn. 2013

311 pp., 272 B/W diagrams and half-tone illustrations. Approx. £45.00 paperback.

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A review by Bill Addis

As the first generation of computer-literate engineers, who resort immediately to using finite element analysis software for all structures, become more senior, and start taking responsibility for conservation projects, it is becoming more urgent to reiterate the message that such software can be at least misleading and sometimes dangerous to use to assess existing structures. While analytical software has an important role in structural assessment, it must come second to a profound understanding of how the existing structures and the huge variety of materials used to build them, behave – both when they were new and today and, as is often the case, how the structure may have been changed during previous interventions and conservation work.

This book (in German) provides an excellent guide to how masonry structures were constructed and how they work as structures, in ways that are often far from obvious at first glance. After an introductory chapter on the assessment of existing structures, the first chapters deals with masonry arches including their construction, properties of materials, structural behaviour, methods of structural analysis and a lengthy discussion of their cracking and collapse mechanisms. The next chapter deals with barrel and ribbed vaults in a similar fashion. Chapter 4 deals with assessing the structural behaviour of cross vaults and groin vaults and, particularly, with the causes and interpretation of various types of cracking. Chapter 5 deals in a similar manner with domes. The final chapter deals with the vertical load-bearing elements of masonry buildings – walls and columns – and their foundations. The bibliography at the end is very wide-ranging and includes the major works on the subject, both historical and modern, in the main European languages, including English (works by Jacques Heyman and Bill Harvey), Spanish (Santiago Huerta), Italian, French and German.

This succinct book is a useful compendium covering the material that an engineer working on the conservation of masonry structures should know and understand before proposing structural interventions. Unlike some studies that deal with truly extraordinary structures (Hagia Sophia, Brunelleschi's dome, St Peters and St Pauls) this book deals with more modest buildings of which many thousands were built all over Europe for nearly a thousand years. By providing the structural and construction background for each type of structure, the author provides the reader with an understanding of how to approach assessing the current condition of a masonry structure. However, the book does not propose guidance on the treatment of defects as these clearly need to be unique and correspond to each individual building. One

subject that has not been sufficiently addressed, perhaps, are the likely causes of many of the cracks and evidence of movement in old masonry structures – i.e. the soil and foundations. It might have been helpful to remind readers of how soil behaves over long periods of time under load, and how this is affected by the presence of, and changes to, the ground water.

The book is recommended to German readers and it is to be hoped that the publishers will produce translations into English and maybe other languages. In the meantime, the second book in the series, on timber construction, by the same author, is due to be published later in 2015. It will be reviewed in a future issue of *Engineering History and Heritage*.