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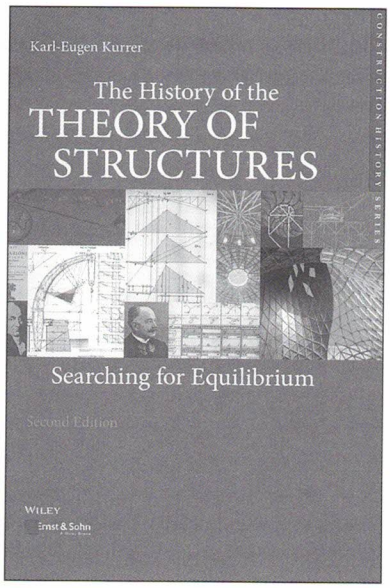
The History of the Theory of Structures: Searching for Equilibrium. (Second Edition)

Karl-Eugen Kurrer Berlin: Ernst & Sohn, 2018. 1212 p., 748 ill., ISBN 978-3-433-03229-9, £125.



This substantial volume is a greatly-expanded (by 50%) second edition of the first edition published in 2008. It is the most comprehensive book on the subject in any language. As well as dealing fully with the origins and development of mathematical methods underlying structural analysis, the book also covers many aspects of the wider context within which structural science was developed, especially the research and teaching undertaken in many institutions.

The content is presented in 15 chapters, which deal with the subject in two ways. Six chapters are devoted to general issues in the history of structures: The tasks and aims of a historical study of the theory of structures; learning from history – 12 introductory essays; the first fundamental engineering science disciplines – theory of structures and applied mechanics; thirteen scientific controversies in mechanics and theory of structures; perspectives for a historical theory of structures; and, brief biographies of 260 protagonists of theory of structures.

The remaining nine chapters deal with historical development in different branches of the theory of structures: From masonry arch to elastic arch; the history of earth pressure theory; the beginnings of a theory of structures; the discipline-formation period of theory of structures; from construction with iron to modern structural steelwork; member analysis conquers the third dimension – the spatial framework; reinforced concrete's influence on theory of structures; the consolidation period of theory of structure; and, the development and establishment of computational statics.

The book concludes with a bibliography occupying nearly 100 pages – some 4,600 printed sources.

The structure of the book makes it a joy to read for it avoids the sequential approach taken in many histories in favour of a thematic approach which allows the reader to follow the key themes in depth without being sidetracked by developments in unrelated fields. The author also provides a well-balanced narrative of mathematical details, practical engineering, and the people themselves involved with various aspects of the history of structural theory.

No historical work can be comprehensive but Kurrer has surely come as close as anyone can. His book (almost inevitably) presents a view of the subject through German eyes and the contributions of some French, Italian, Belgian and British names is given less prominence than they receive at the hands of historians in those countries – for example the work of André Paduart in Belgium, on tensile structures by René Sarger in France, the work of Pier Luigi Nervi, and the work of Ronal Jenkins in Britain. It would also have been good to read about the innovative use physical models to create remarkable structures by engineers such as Heinz Hossdorf and Frei Otto. Such under-emphasis, however, is more than outweighed by the enormous wealth of information about the contributions made by the great engineers and scientists from German speaking lands, many of whom are hardly known outside these countries – August Föppl, Konrad Zuse, Franz Joseph Gerstner, August Hertwig, Emil Mörsch, Wilhelm Ritter, Hubert Rüsch and Johann Schwedler, to name just a few.

Kurrer's achievement in compiling this book is colossal, and I commend it to everyone interested in the subject. It will, for a long time, stand well along side the other classics of the field – Timoshenko's "History of Strength of Materials" and Eduardo Benvenuto's "Introduction to the History of Structural Mechanics".

Bill Addis is an engineering historian and author of "Building: 3000 years of design, engineering and construction" (London, Phaidon, 2007).