extensive and authoritative reference which will serve them for many years to come.

Aleksandar Pavic

***Large Concrete Buildings*, B.V. Rangan, R.F. Warner Longman; Concrete design and construction series, 1996. 269 p. ISBN 058210130-1, Hbk 68 approx**.

This textbook is a compilation of works of 11 renowned authors who tried to outline 10 important topics matching their expertise in the design of concrete buildings. The 10 design themes covered are: *Life Cycle Planning*: *Durability*, *Performance and Design Life* written by G. Somerville, *Structural Modelling of Concrete Buildings* by R.F. Warner, *Computer Aided Analysis and Design* by M.C. Griffith, *Estimation and Accommodation of Column Length Changes in Tall Buildings* by S.K. Gosh, *Rational Methods for Detailing and Design*: *Strut-and-Tie Modelling* by K.-H. Reineck, *Fire Engineering Consideration* by K. Kordina and M. Kersken-Bradley, *Applications of High-Strength Concrete* (*HSC*) by B.V. Rangan, *The Use of Masonry in Concrete Buildings* by A.W. Hendry, *Precast Concrete Skeletal Structures* by K.S. Elliot and *Movement Joints*: *A Necessary Evil*, *or Avoidable*? by J. Ruth.

The titles of the sections indicate that the textbook does not describe the design process of large concrete buildings. Instead, the textbook is all about describing some important design considerations in a rather general way. For example, right at the beginning G. Somerville fascinates the reader by outlining fundamental changes in concrete and steel material properties, structural behaviour of concrete buildings and in the general philosophy of concrete building design which have occurred in the last half-century. Average concrete and steel strengths used in everyday design have been doubled whereas the cost of an average building superstructure and its weight have halved. As the cost of superstructure in mid-1980s was less than 10% of the cost of the whole building (comprising, in addition to superstructure, cost of foundations, cladding, finishes and services), G. Somerville was brave enough to suggest that, if this trend continues, building superstructures would be delivered to a client practically free of charge by 2010!

The following section dealing with structural modelling of concrete buildings contains much useful information about the general concepts and basic philosophy currently employed when rationalising concrete structures. After reading this very informed state-of-the-art review, colleagues from other engineering disciplines, such as mechanical and aerospace engineering, would be quite surprised to see how unconcerned civil structural engineers are with the level of simplification when performing structural modelling. Behaviour of buildings as 'continuous' real-life structural systems can be modelled by 3D discrete frames, and these can be simplified by 2D models, and these may be further simplified by simple one-line formulas if no computers are available. Recognising that a balance is required between accuracy and simplicity, R.F. Warner warns in the concluding part of this section that "the likelihood of design error tends to increase with increasing sophistication of computer software, especially when a mature understanding of structural principles is lacking". If this sounds discouraging for those planning to start using computers in structural modelling, it is worthwhile reiterating here that when the intuitive understanding of structural behaviour is lacking, the application of one-line formulas is equally dangerous.

The third section of the book is devoted exclusively to computer modelling of concrete buildings under static and dynamic loading. Regarding the latter, the writer made a common mistake by defining dynamic loading as a "function of time", rather than a loading which engages inertia forces. Presented on only 14 pages, this is only an overview of a very complex matter which is nowadays widely recognised as being both science and art. Some interesting comparisons are presented here. For example, 3D and 'equivalent' 2D analyses of a building frame were compared in terms of time required to perform them on a PC having a 486 processor. The 3D analysis was 40 times slower which is an interesting ballpark figure which everybody should bear in their minds when deciding on the type of model. Managers who once upon a time had hands-on experience with computer modelling but got detached and rusty, will find this section quite useful for refreshing their knowledge and skills.

The remaining seven chapters are equally informative and interesting. However, it is a bit disconcerting to see that Section 4, on the estimation and accommodation of column length changes in tall buildings, is presented on 48 pages. This is more than three times longer than the chapters dealing with general and computer modelling of buildings. It appears that the balance of information presented in various sections in the textbook has not been struck well.

The textbook is printed on a good quality paper and it is equipped with excellent and consistent graphics with only a few photographs, which is a pity considering some of the topics presented, such as fire engineering. Although the writers come from all over the world, SI units are used consistently throughout with some unit conversions given where appropriate to aid reading.

This textbook is not really appropriate for the teaching of undergraduate students and it would be most useful to practising engineers well versed with the general philosophy of design, to whom the book is clearly aimed. Also, for post-graduate research students working in any of the ten general areas covered in this textbook, the relevant sections are highly recommended as core reading.

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