Book reviews

Prestressed Concrete : Theory and Design

by R. H. Evans and E. W. Bennett

Published by Chapman and Hall, London. 1st edition, 1958. pp. 294. Price 60s.

Books on prestressed concrete have been appearing very frequently over the past few years and, no doubt, will continue to do so for many years to come owing to the very great interest in and use of this material. This particular book is welcome in that it concerns itself primarily with the basic principles and does not include lengthy descriptions of the various practical methods available for prestressing which, as the authors say, are readily available elsewhere.

The book is divided into three section. Section 1 deals with the analysis of simply supported beams. In this section the fundamental properties of prestressed concrete are considered and the different conceptions involved in this method of construction, as compared with normal reinforced concrete, are amply discussed. The materials of prestressed concrete, both the concrete and the high-tensile steel, are discussed at considerable length and this particular chapter covers much of the research work carried out at the University of Leeds. Some of the points discussed in this section, in particular with regard to the flexural strength, the transmission length, and the anchorage stresses in prestressed concrete beams, are controversial and the authors have naturally given their opinions. However, many references are given which will enable the reader to draw his own conclusions.

Having discussed the principles in considerable detail, the authors deal with the design of simply supported beams in the second section of the book. This has been admirably presented and will be easily understood by both students and graduates working in this field. Many tables of the section properties are included in the Appendix, and these are particularly useful from the design point of view. It should be mentioned that the design method put forward is based upon the logical consideration of the ultimate load, and working load, and properties of the material, so that the unit is derived to satisfy all the requisite conditions. There are numerous examples of the design methods put forward and, as with the rest of the information in this section, these are admirably clear.

The final section deals with what are termed special applications of prestressed concrete and includes composite construction, statically indeterminate structures, reservoirs, tanks and shell roofs, etc. Naturally the authors could not cover such a wide range of subjects exhaustively but there is, in general, sufficient information given to enable the designer to appreciate the problem and also the means by which it can be tackled. The chapter on the analysis of statically indeterminate structures is of value in that it presents a relatively straightforward method of determining the secondary moments caused by the prestressing cables and further gives a table enabling these secondary moments to be determined easily and accurately in a design office.

Although many aspects of the book, particularly on subjects such as those mentioned above, are open to controversy, the authors can be congratulated on having produced a book logical in form and easily understood. It is a valuable contribution to the literature on prestressed concrete and should be especially valuable to students approaching the subject for the first time.

Prestressed Concrete : Theory and Practice

by P. B. Morice and E. H. Cooley

Published by Sir Isaac Pitman and Sons Ltd, London. 1st edition, 1958. pp. viii & 394. Price 57s. 6d.

The problem facing authors of books on prestressed concrete is a considerable one in that, within a relatively short time, the application of this material has expanded to cover the whole field of civil and structural engineering. Associated with this has been an extensive programme of research and development.

These call for a careful selection of what to include and to exclude. The book by Morice and Cooley has attempted to cover much of both the research and the practical developments.

After the historical background and the properties of materials have been briefly considered, the theory of statically determinate and indeterminate beams and frames is considered. The two chapters on these subjects are eminently readable and the problems of concordant cables and transformation profiles are clearly explained. However, the analysis rather than the design is discussed, and some practical design examples would have been welcome.

The chapters on " Tanks and pipes ", " Bridge deck analysis ", and " Deformation of prestressed concrete and transmission length " are admirable but, of necessity, are brief and could well have been supplemented by a more extensive list of references. The treatment of tanks and pipes by the influence coefficient technique is especially worthy of study and is a most useful contribution to this particular problem.

There follows a series of chapters on the practical methods of prestressing concrete both by pre-tensioning and by post-tensioning. This section of the book gives a very good background to the practical problems and certainly merits study by those unfamiliar with the techniques. Unfortunately, because of the rapid developments in the various systems, many new features have appeared which the authors were not able to include.

The problems of friction and anchorage stress are discussed in detail. The former is very comprehensively treated since one of the authors was responsible for the fundamental research which has formed the basis for tackling this problem for a number of years. The anchorage stresses are tackled by the well-known methods due to Guyon and Magnel and the presentation here is good.

The final chapters contain descriptions of various types of structure in prestressed concrete. For the newcomer to the subject, these are well chosen to illustrate the possibilities of the material and the scope it presents to the designer.

The Design of Prismatic and Cylindrical Shell Roofs

by David Yitzhaki

Published by Haifa Science Publishers, Haifa, P.O. Box 4910, Israel. 1st edition, 1958. pp. 253. Price $11.

The use of thin concrete shell roofs has increased tremendously during the past decade and associated with this has been the presentation of many papers and books on the theoretical aspect of the design of such structures. For the majority of these, an analysis has been derived in which the fundamental differential equation governing the behaviour of shell roofs as membranes has been considerably modified to enable solutions to be obtained which are applicable in a design office with a minimum of computation. This book treats the problem in a totally different manner by considering what is termed the prismatic shell structure, or hipped plate structure, consisting of a series of intersecting plane surfaces.

Such a structure may be analysed using the basic concepts of the theory of structures and, in particular, by the principle of superposition of various effects. The complete structure is divided into its compatible elementary portions, each of which contributes to the over-all resistance of the structure, and the individual elements are subjected to what are termed " particular " loadings for which simple basic solutions are derived. From a series of " particular " loadings any actual loading may be represented and hence an approximate solution derived for the entire structure. This procedure is eminently suited to tabular presentation and the additional complications of secondary effects, caused by edge members and transverse ribs, introduced to give the required degree of accuracy. The method is illustrated by a number of examples which clearly show the step-by-step procedure involved.

Finally this approach is applied to the limiting case of a cylindrical shell which, naturally, can be analysed in an analogous manner.

The relation between the proposed method and the classical methods of analysing shell roofs is discussed and it is shown that the proposed method is in fact the solution of the equations of equilibrium and compatibility treated by finite differences with further simplifying approximate procedures.

The book may be recommended to those interested in the analysis and design of shell roofs but is, as its title shows, applicable to only a limited field. The detailed treatment of particular loadings and the tabulated information will be of interest in other fields of structural analysis.

Symposium on Prestressed Concrete as applied to Buildings

Edited by B. N. Chatterjee

Reported in a special issue of *Indian Construction News*. Vol. 7, No. 8. August 1958. pp. 15-136. Price: Rs. 5.

The papers presented at this symposium are of general interest to all concerned with the use of prestressed concrete as a building medium.

The first section of the symposium contains papers which deal solely with the methods of pre- and post-tensioning which have been evolved in India to avoid