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Concrete Research

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Editorial comment

IN THIS COUNTRY recent trends in concrete research appear to indicate that, while a certain amount of work is still being done on the development of practical applications of concrete, increasing attention is being given to more fundamental aspects of the material. The articles published in this magazine shows evidence of this tendency.

Designers of both ordinary reinforced and prestressed concrete are paying increasing attention to the " load factor " basis of design, and for this reason experimental research cannot be confined merely to the measurement of working load stresses, but must take into account the more complex situations which occur near the ultimate load of a structure. Research on reinforced concrete, therefore, is inevitably being directed towards a study of the behaviour of the material in the plastic range. Professor A. L. L. Baker's paper in this issue is a further step in this direction and shows where our knowledge of the mechanism of plastic failure is lacking. Many studies of the properties of materials are passing beyond the scope of the engineer and require the attention of the physicist and the chemist. Among these are X-ray diffraction methods, such as are now being used at Birkbeck College to extend the study of the molecular structure of cement compounds, and especially in relation to their behaviour during the hydration process. Volume changes in concrete due to moisture movement are often very real problems in practical construction and fundamental work of this nature promises to provide a better understanding of the problems.

The adaptability of electronic equipment with its almost unlimited possibilities is being applied in the field of concrete testing, especially in the United States of America. Non-destructive methods of measuring the quality of materials now promise to have wide application for testing in situ concrete. The work being carried out by Dr. Jones of the Road Research Laboratory should provide practising engineers with a much needed instrument for testing the material in a structure. The interpretation of such tests could be made with more confidence than that of the existing cube crushing strength test which, as is well known, provides only a very limited amount of information regarding the concrete in the actual structure. Work such as this is, however, often considered too academic to be of interest to the practising engineer. Consequently, it has not generally been widely reported and may remain unknown to the practical man.

An interesting example of this is the case of Professor Zielinsky* of the Budapest University of Technical Science, who, in 1909, read a paper at the

* " The development of the setting of Roman and Portland cements in pastes, in mortars and in concretes." *Proceedings of the International Association for Testing Materials*, Volume I, Paper X.12.

5th Congress of the International Association for Testing Materials on tests made on cement pastes, mortars and concretes. In his conclusion Professor Zielinsky wrote: " . . . it can be concluded that apart from the quality of cements, the strength attainable with them (i.e., mortars and pastes) is in the first place and to the greatest extent influenced by the quantity of water added in the working up process " and " . . . the strength attainable with concrete, so long as the gravel used for the latter is stronger than the mortar, is always nearly equal to the strength of the mortar used for it. For the strength of concretes, then, the criterion is given by the quality of the mortar contained in them." The fundamental laws were not generally recognized, however, until Professor Duff Abrams† wrote his well-known paper on the " Design of Concrete Mixtures," in December, 1918, in a form which had a direct appeal to those engaged on concrete mix design.

The subject of prestressed concrete is attracting the attention of increasing numbers of engineers, contractors and architects and last December after a meeting of those interested had been arranged by the Cement and Concrete Association, the Prestressed Concrete Development Group was formed. It is intended that the Group will help to encourage the use of prestressed concrete as well as to obtain information on new developments. Membership is open to those actively interested in prestressed concrete. As reported in this issue, several University departments are engaged in research studies of prestressed concrete and if the new methods of construction are to advance there must be close co-operation between research and practice.

We have been fortunate in enlisting the co-operation of Dr. T. W. Parker, Deputy Director of Building Research (D.S.I.R.) and Professor A. D. Ross, of King's College, University of London, who are both well known in the field of concrete technology, and who have agreed to serve on the Editorial Advisory Board.

In this issue we have included a section reporting the activities of some of the Universities which are engaged on concrete research. We hope to foster co-operation among University and other research laboratories by the inclusion of such news items and we should welcome any material of this nature for future issues.

Readers are reminded that space will be allotted to discussion on any of the papers published, provided such material is received within three months of the publication of the article concerned. Full freedom of expression is given to all contributors to the Magazine, but their opinions must not necessarily be regarded as those of the Association.

All correspondence relating to the Magazine should be sent to the Cement and Concrete Association.

† ABRAMS, PROFESSOR DUFF " Design of Concrete Mixtures." *Structural Materials Research Laboratory, Lewis Institute, Chicago*, Bulletin No. 1 (December, 1918).