

## MATERIALS FOR STUDENTS AND DESIGNERS

### Strength of Materials

By Prof. S. Timoshenko. Second edition. Part 1: Elementary Theory and Problems. Pp. xiii+359. Part 2: Advanced Theory and Problems. Pp. xiii+510. (London: Macmillan and Co., Ltd., 1940-1941.) 2 vols., 50s. net.

IN 1938 a remarkable tribute was paid to Prof. Timoshenko on the occasion of his sixtieth birthday. Advantage was taken at the annual dinner of the American Society of Mechanical Engineers to honour him by a programme of appreciative speeches and to present to him a commemorative volume in which original articles, dealing with various aspects of the mechanics of solids, had been contributed by engineering and scientific friends each with an international reputation. It is not surprising, therefore, that text-books from Prof. Timoshenko should be welcomed by all interested in the progress of engineering learning.

The present review deals with the second edition of his now famous work on the strength of materials. This is divided into two volumes, the first of which is devoted very largely to the presentation of matter usually taught in engineering degree courses dealing with the strength of materials. For post-graduate students and research workers the second volume will be found particularly suitable, since it deals with those difficult features of engineering design and investigation which all engaged in engineering production must, at some time, inevitably encounter.

Although no great changes have been made in this second edition, yet where experience has shown that teaching requirements may be better met, modifications in the methods of presentation have been adopted and some of the more advanced work, originally contained in Part 1, has now been transferred to Part 2. In place of this advanced matter, a more extended treatment has been given in Part 1 to some of the problems previously expounded rather briefly, with the result that the student will now read these with greater understanding.

Space will permit of only a brief reference to the contents of these volumes, but some attention may be given to a few features. Thus the admirable arrangement of Chapter 1, dealing with tension and compression within the elastic limit, can be especially commended. Here the student is gradually led from the most elementary consideration of stress and strain up to the solution of quite difficult problems by a skilful blending of descriptive matter and excellent examples. In like manner, the method of dealing with the deflection of loaded beams calls for admiration. Commencing with the equation of the deflection curve, the usual integration method of determining deflection of cantilever and simply supported beams with different types of loading is first employed, and here again the arithmetical examples provided are particularly suitable. This is followed by illustration of the use of the bending moment diagram and the method of superposition, whereby the solution of difficult problems under complicated systems of loading and different methods of support can easily be effected. Later on, the elastic strain energy method is given and attention directed to considerations of the effect of shear. In all this fundamental work, the manner in which the student

is conducted from the simple to the more complicated problem is a great tribute to the powers of Prof. Timoshenko as a teacher.

In Part 2, special attention is given to the later developments, both theoretical and experimental, of practical importance in the fields of strength of materials and theory of elasticity. Problems connected with aeroplane construction are considered under the investigations into the bending, compression and torsion of slender and thin-walled structures. A chapter is devoted to plastic deformation and another to experimental investigations on the behaviour of materials at high temperatures and to fatigue under conditions of stress reversal.

Although for much of the work in this volume a fairly high standard of mathematics is required, yet the author never omits to place the practical engineering considerations before the reader, and continual references are made to original papers on the subject under discussion. Thus, following the mathematical treatment of stresses produced by shrink fits, attention is directed to special articles dealing with experimental investigations into this class of engineering construction. It is suggested here that some mention might have been made of the work of Russell, who showed experimentally that the effectiveness of the shrink fit largely depends upon the surface cleanliness of the two mating elements.

One difficulty to British students will arise from the author's use of symbols which differ appreciably from those employed in our own text-books. In this second edition, changes have been made in the notation to conform with the requirements recently adopted by the American Society of Mechanical Engineers. It is to be hoped that it will not be long before a standard list of symbols will be drawn up which will be common to both countries.

## WEATHER STUDY

### Weather Study

By Prof. David Brunt. (Nelson's Aerospace Manuals.) Pp. 216. (London and Edinburgh: Thomas Nelson and Sons, Ltd., 1942.) 5s. net.

WAR has always been very much at the mercy of the weather, and the advent of flying emphasized the dependence. Between 1914 and 1917, meteorology gradually came to be an essential part of the fighting organization, though the scientific side of the work was still in the hands of a relatively few professionals. In the present conflict some knowledge of the subject is essential, or at least helpful, to a large number of 'other ranks', while the number of civilians engaged on work in which the physical processes of weather are directly or indirectly involved must run into thousands in Great Britain alone. These men and women, mostly young and intelligent but with little specialized training, are eager to learn; yet the range of suitable text-books open to them is sadly limited. Hence Prof. Brunt's new semi-popular book, written explicitly for this class of reader—he mentions in particular Air Force Cadets and students of radio-location—is very welcome.

The emphasis on weather study has shifted very definitely from the descriptive to the analytical side, and especially to the physics of weather. The early meteorologists were for the most part content to