Book Reviews

Strength and Failure of Viscoelastic Materials

G. M. Bartenev and Yu. S. Zuyev
Translated by F. F. and P. Jaray

Pp 419 (Pergamon, Oxford, 1968) £7

This text makes a useful contribution to the literature of the mechanical behaviour of polymeric substances. Being a translation from the Russian it provides a convenient form of reference to the many contributions on the subject from the Soviet Union, but suffers, as translations always do, in being no longer up to date. The original was published in 1964, and the most recent references are therefore about 1963. Thus the important and more recent work of Andrews, Berry, Keller, Rosen and Zaukelies, to mention only a few, is not included. Neither is there any detailed mention of the micro-structural aspects of deformation, again a fairly recently-developed subject.

The authors deal, *inter alia*, with the basic theory of strength of solids, deformation and strength of crystalline and amorphous polymers, failure mechanisms in fibres, in bulk, glassy polymers and in viscoelastic polymers, the statistical theory of strength, and the tearing of polymers. They discuss at length the effects of temperature, molecular weight, rate of deformation, fillers, and cyclic loading upon strength and failure. Particular importance is rightly attached to the problems of corrosion cracking, ozone cracking, swelling, and other aspects of the failure of polymers in aggressive environments.

The translation of this useful volume is, unfortunately, less than perfect, and although this does not usually lead to confusion, it is irritating to find expressions such as "tensioning" for "stretching", "time-temperature connection" for "superposition", and "silver cracks" for "crazes". One feels that such small defects could easily have been avoided. A glossary of Russian polymer designations is thoughtfully provided, however. A curiosity occurs on p. 33, where there is a correlation between observed values of activation energy for deformation of several materials, including plastics and metals, and the energy of chemical bonding (for plastics) or of sublimation (for metals). Values between 51 and 55 kcal/mol are given for aluminium, whereas from the very exhaustive work of Dorn and his associates it has been very well established that the highest measured activation energy for creep in aluminium is about 38 kcal/mol, this being identical with the self-diffusion activation energy. No satisfactory explanation of this discrepancy appears in the text.

B. HARRIS

Strength of Materials

(Translated from the Russian by L. K. Lusher)
A. A. Ilyushin, V. S. Lensky

Pp 442 (Pergamon, 1967) £6 10*s*

This is, for the most part, an addition to the long list of books already available at much lower prices on the subject of mechanics of deformable bodies. It includes the basic material contained in most undergraduate courses, viz. analysis of stress and strain, linear elasticity theory, elastic and plastic instability, and vibrations. It also contains chapters on creep, dynamic resistance and fatigue (the latter treated most unsatisfactorily), and concludes with a discussion of mechanical testing methods. The authors state in their Introduction that they have adopted a more general approach than is usual in "strength of materials" books by considering the atomic nature of materials. However, they pay lip-service only to the atomistic basis of materials behaviour, and their asides in this direction are totally inadequate. Viewed simply as a conventional engineering text, the book is reasonably satisfactory, and includes a more complete treatment of plasticity than is usual. None of the figures carry captions, which is frequently irritating, and although there are many references in the text to research workers in this or that country, there is, unfortunately, no detailed bibliography.

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