fatigue limit of steels may thereby be raised. In overstressing, he carries out tests, which again are virtually repetitions of experiments that have been familiar to Western workers for many years. He relates his observations to the way his steels harden during cyclic deformation, paying no attention to local changes in their chemical composition which, as Sinclair at the University of Illinois showed some time ago, could affect his results in a more fundamental way. On the basis of these observations he recommends that some service parts such as tool steels and roller bearings might benefit from appropriate prestressing programs and gives some supporting examples. His recommendations might seem naive to workers in this country who, also concerned for example with fatigue behavior of bearings, have found it desirable to develop sophisticated treatments such as the General Motors process of "marstressing".

After some extension of his experiments on overstressing to others on short-time overloading, the author concludes with the problem of whether fatigue behavior can be predicted from single static tensile tests on a metal. This part is of more interest than the preceding routine tests, possibly because the author, judging from other publications, may be more familiar with static deformation than cyclic deformation. He concludes that fatigue behavior can hardly be predicted from static tests during which a specimen deforms slowly as in creep, or from normal tensile tests during which a speciment still deforms more slowly than in fatigue test, but that it might be predicted from so-called dynamic tests in which deformation to facture takes only a few hundredths of a second. Accordingly he describes an apparatus for determining dynamic strengths and proposes relevant formulae.

Thus, although the book is intended for engineers and designers, Western workers would find it limited in scope and certainly in originality. There is no reason why any worker should not repeat work already written up, if he feels he can add something new, but there is also no reason why he should publish the results, if he can't. The fact that a Soviet worker does so suggests that he has an audience of engineers whose knowledge of fatigue problems is elementary.

W. A. Wood studied under Sir W. L. Bragg at Manchester University, UK, receiving his BSc with top honors in 1928, his MSc in 1929, and his doctorate in 1935 in physics. Post-doctoral work with Bragg centered at the National Physical Laboratory, UK where there later developed a Metal Physics Division of which Wood became head. The winner of two awards for his studies on the strength of metals and another for work on creep of metals, he was with Melbourne University, Australia, from 1948 to 1964. Currently he is a professor in the Department of Civil Engineering and Mechanics, Columbia University.

DISLOCATIONS AND THEIR MOVEMENT

Title The Strengthening of Metals

Editor Donald Peckner

Publisher Reinhold Publishing Corp., 1964

Pages vi plus 250

Price $12.50

Reviewer Robert M. Goldhoff

This book has as its purpose a review of the mechanisms by which metal are strengthened. The editor chooses as his base the atomistic scale of observation and has his competent contributing authorities develop the subject in a most logical and comprehensive way. Thus, the opening chapter discusses the basic concepts of dislocations and their role in determining metallic strength. This is then followed by equally lucid descriptions of the basic mechanisms of strain hardening, solid-solution hardening, precipitation hardening, dispersion hardening, martensitic transformation hardening and finally strengthening by superlattice formation.

Since the book is devoted to dislocations and the manner in which resistance to their motion is affected by the basic strengthening mechanisms, it is likely to be most appreciated by those wishing to become acquainted with the important general developments in this area. It will provide an excellent review for the metallurgist who wants to be abreast of these important developments and at the same time it will be a reasonably simple yet complete introduction to dislocation concepts for the non-metallurgist seeking knowledge of metallic behavior. To insure this purpose the first chapter incorporates the novel approach of amplifying each point made by suggesting illustrative problems for the reader to solve before proceeding further. The point is made that interested readers can develop their reasoning ability independently by working out such problems without the aid of established viewpoints and therefore no literature references are appended. It seems likely that the average reader with a minimum of time to devote to this pursuit will occasionally find himself unable to answer a query and finding no ready reference to which he can turn will proceed with a vague discomfort and annoyance at this obstacle. I believe a good bibliography at this point would have been helpful. This is a minor point and for the reader who does diligently complete the book the knowledge gained will be a maximum for a minimum of effort.

This entire subject is a difficult one to treat without involving a great deal of scientific complexity, yet this book succeeds in retaining reader interest without sacrificing the necessarily involved concepts. It is written clearly, concisely, and competently. I recommend it, in general, but in particular to those who fit the categories discussed above.

Robert M. Goldhoff, for the past ten years, has been Supervisor of Applied Metallurgical Research in the Materials and Processes Laboratory of the Large-Steam-Turbine-Generator Department of General Electric, Schenectady, N.Y. A metallurgical engineer, he graduated from the University of Cincinnati in 1943 (in chemical engineering) from where he also received his MS degree in 1950. His PhD degree (in metallurgy) was earned from Ohio State University in 1955. Prior to this he was a metallurgist with Battelle Memorial Institute for four years and with Dayton Malleable Iron Co. for three. He is a member of ASTM, AIME, and ASM.

FOR MECHANICAL ENGINEERS

Title Mechanics of Deformable Solids

Author Irving Shames

Publisher Prentice-Hall, Inc., 1964

Pages vi plus 532

Price $11.95

Reviewer Thomas V. Sheehan

Perhaps the most telling observation I am able to make for this book is to say that, during the three-month period in which I delayed writing this review, I used the book as reference material in the solution of several problems that came before us. The work has several characteristics that should appeal to practicing engineers.

1) It contains the classic static mechanics cases as one might remember them from elementary mechanics and, therefore, looks like a familiar friend; yet one is led smoothly into more-sophisticated analytical methods beyond the scope of elementary works.

2) New chapters often contain introductions that remind one of what has gone before and how this may help in tackling the next step.

3) The diagrams and illustrations, on which the analysis are based, are excellent and, more often than not, clearly relate to the everyday situations that engineers encounter.

4) The problems are practical and recognizable as having strong foundations in reality.

The book is divided into three major sections. Part I is concerned with the fundamentals of the Theory of Elasticity. Part II deals with analysis of beams, columns, shafts, etc. with additional references to energy methods. The third subdivision of the text is a series of ten appendices, which are generally designed to enable the user to apply more-advanced analytical methods of the material covered in earlier chapters, if desired. The tenth of these appendices is a well-organized description of properties of engineering materials. It was prepared by F. A. Cozzarelli and describes in a lucid fashion the influence of the nature of the atoms and their molecular lattice structure on the properties of material. This appendix also treats at length the mechanism of various kinds of physical deformation, including thermal expansion, creep, and static and fatigue slippage.

The reviewer believes this work would be valuable both to engineers who are practicing in fairly advanced stress analysis and to those who do not have the time or duty to carry out this kind of work, but who wish to know, in a general way, the things that need be done to be sure of good solutions.

Thomas V. Sheehan is a Senior Mechanical Engineer at Brookhaven, where for the past several years, he has been managing the Brookhaven technical group designing the new High Flux Beam Reactor. After receiving the BS degree (mechanical engineering) from the University of Illinois, he spent many years in the oil refining field, in engineering design and operation of processing equipment. With Brookhaven since 1947, he was involved in the mechanical and process design of the Brookhaven Graphite Research Reactor. Later he formed in the BNL Nuclear Engineering Department, an engineering and construction group responsible for design and construction of facilities for the research staff.

A MISDIRECTED EFFORT

Title Analytical Chemistry of the Actinide Elements

Author Alfred J. Moses

Publisher Pergamon Press, 1963

Pages vii plus 137

Price $6.00

Reviewer L. Newman

As a person intimately involved in the analytical chemistry of the actinide elements, I would not hesitate to purchase a copy of a new book with a name such as this. Surely the same applies to many other people and most libraries. I am sorry to have to report that all who try to use the book will probably be dissatisfied.

Moses has written a very short book, less than 100 pages of text, on what is admittedly a specialized field that might, therefore, warrant a short intensive treatment. However, in this limited space the author attempted to cover all aspects of the analytical chemistry of the actinide elements, including such things as a chapter to introduce the reader to nuclear instrumentation. What results is a very sketchy book, the value of which is reduced still further by the author's frequent selection of methods that are not in general usage.