*at the US Military Academy. Author of some 30 technical papers on reactor kinetics, reactor noise, neutron wave propagation, and nuclear engineering education and Editor of* Noise Analysis in Nuclear Systems, *he received the 1962 ASEE (Southeastern Section) Award for the best technical paper. He holds several important posts in the ANS and in other professional societies. His BS degree in mechanical engineering was received with honors from the University of Illinois in 1948; his MS and PhD degrees in theoretical and applied mechanics were received from Iowa State University in 1950 and 1954.*

## AN EXCELLENT STARTING POINT

*Title* Thermal Stress Techniques in the Nuclear Industry

*Authors* The Franklin Institute Research Laboratories; Z. Zudans, T. C. Yen, W. H. Steigelmann

*Publisher* American Elsevier Publishing Co., Inc. (1965)

*Pages* XXII + 583

*Price* $20.00

*Reviewer* Raymond J. Parsick

The authors rightly use the word "techniques" in the title of their book. It is an excellent summary of technical methods and tools for determining temperature distributions in components and resulting stresses. From several fields, the authors have assembled basic theories pertinent to thermal stress problems, and they present the digested material with admirable lucidity. Numerical examples amply illustrate applications of the theories. In addition, a considerable amount of quantitative information pertinent to specific problems is scattered throughout the book.

The authors begin with a rather superficial, but adequate, description of nuclear power plants, which is apparently intended for those not involved in reactor design.

Chapter 2 deals with determination of temperature distributions. Of necessity, emphasis is on techniques rather than published solutions by other authors. Some generalized solutions for temperature distributions in simple geometries is presented in this chapter, mostly in graphical form. Unfortunately, the graphs cause considerable eyestrain and numerical information is often difficult to extract. Fortunately, titles for many graphs contain a reference to their source, although the referenced source is not always the best place to obtain information. For example, the authors present some charts for central temperature change in semi-infinite bodies subjected to a step or ramp change in surface temperature. The references in the figure titles would send the reader to Carlson and Jaeger, *Conduction of Heat in Solids*, or to Schneider, *Conduction Heat Transfer*, excellent books for many purposes. However, National Bureau of Standards Monograph 2 presents the same information in 19 pages of tables which permit easy determination of not only temperature but also thermal stress distributions. Therefore, this chapter lacks clear quantitative information about known solutions for simple geometries but excels in presenting the approach and tools for more difficult problems.

With a similar emphasis, Chapters 3 and 4 deal with the techniques for determining elastic and plastic stresses and Chapters 5 and 6 discuss applications to plant components. The authors have done more than compile proven techniques for analyzing creep, thermal fatigue, axisymmetrical structures, and design considerations of reactor components. They have also added original material to fill several gaps in the literature. They provide procedures for analyzing arbitrarily shaped rings, axisymmetric redundant structures, and plates connected by elastic elements supported on an elastic foundation.

As a consequence of the emphasis on techniques, an engineer looking for a ready answer to a simple problem will have difficulty finding it in this book. However, an engineer entering the nuclear field who faces a new problem in thermal stress analysis will find this book an excellent starting point for the problem's solution.

*Raymond J. Parsick worked at Bettis Atomic Power Laboratory on the thermal, hydraulic, and mechanical design of the nuclear reactors for the aircraft carrier Enterprise and the cruiser Longbeach, from conceptual design through the sea trials. Since 1962 he has worked at Brookhaven National Laboratory on the development of the Settled Bed Fast Reactor concept. His BS is from Carnegie Institute of Technology.*

## PURSUED BY OBSOLESCENCE

*Title* Beryllium - Its Metallurgy and Properties

*Editor* Henry H. Hausner

*Publisher* University of California Press, 1965

*Pages* 322

*Price* $9.00

*Reviewer* Norman P. Pinto

The development of beryllium technology proceeds at a relatively rapid rate, and broad surveys are periodically welcome to both user and producer. This volume provides a review of products and properties capably presented by contributors active in the field. Chapters on extraction and metallurgical fundamentals are generally reviews of prior work, but material on sheet rolling, forging, and casting is new and useful. Important data on product uniformity and reliability are presented and signal beryllium's coming of age.

The book must be reviewed as a collection of papers presented as an extension course to listeners who have a wide range of backgrounds and interests. As such, it should not be faulted for review material and references less extensive than Darwin and Buddery's *Beryllium*, a definitive review and critique of the beryllium literature to 1960. Nor is H. H. Hausner's book to be judged as a text, which it is not.

For a survey volume, several authors should have been more diligent in including material other than their own and should have concentrated on telling rather than selling. Trade names have become traditional, for lack of industry standards, but they detract from readability and usefulness. More ruthless editing might have pruned some excessive detail and questionable data. The most serious criticism is lack of an index, without which such references are most difficult to use effectively. Note should be made of possible obsolescence, since this is a survey as of March, 1963, and technological advances since that date are numerous.

*Norman P. Pinto, Vice President of The Beryllium Corporation, graduated from MIT and has been active in the beryllium field since 1943. He conducted research on the fundamentals of beryllium powder metallurgy and later managed a major beryllium refinery and production plant. Currently, he is responsible for research and development in beryllium and beryllium alloys. He has contributed significantly to the literature on beryllium metallurgy.*

## A PAINLESS PILL

*Title* Sampling

*Author* Morris James Slonim

*Publisher* Simon and Schuster, 1966

*Pages* xiii + 143

*Price* $1.45 (paperback)

*Reviewer* Margaret K. Butler

The author has based this book on notes originally published in a US Air Force Statistical Services Technical Letter written to instruct Services personnel in sampling and the value of the sampling technique. It is essentially a sales pitch for the use of sampling, prepared for those unfamiliar with this statistical tool.

The paperback consists of an expanded glossary of sampling terms—universe, sampling with and without replacement, tolerance, confidence limits, sampling error—and methods including random sampling, stratified, cluster, and systematic sampling. Even interpenetrating replicate subsamples are defined, all in a highly palatable style accompanied by humorous examples and drawings. Brief descriptions of polls, television program ratings, quality control, and acceptance sampling procedures are also included as well as a wide variety of case histories giving the reader the impression of having covered the sampling waterfront albeit in a somewhat breezy fashion.

The book is an interesting extracurricular evening's reading. If after this sugar-coating one elects to swallow the pill and use sampling it would be wise to devote a few additional hours reading more substantial tests on statistical methods. If not, he's had an enjoyable experience, painlessly acquiring an overview of the subject.

*Margaret Butler is a mathematician in the Applied Mathematics Division of Argonne National Laboratory. After receiving her BA degree in mathematics from Indiana University, she served as a statistician with the US Bureau of Labor Statistics in Washington, D. C., and the US Air Forces in Europe. She has been a member of the Argonne staff since 1948, except for a two year break when she headed a Minnesota-US Bureau of Labor Statistics payroll project in St. Paul, Minnesota.*

## FORMULAS - HUNDREDS OF THEM

*Title* Formulas For Stress and Strain (4th Ed.)

*Author* Raymond J. Roark

*Publisher* McGraw-Hill Book Company, 1965

*Pages* xiii + 432

*Price* $12.50

*Reviewer* M. M. Lemcoe

This book brings together, in working-reference form, basic definitions, assumptions, formulas, and principles pertaining to strength of materials. Part I comprises two chapters which contain definitions of pertinent terms used in strength of materials or materials technology, and the symbols and units used in formulas appearing later in the book.

The four chapters of Part II deal with the general behavior of materials under stress, failure criteria, and effects of materials properties on the static, dynamic, and fatigue behavior of materials. In addition, the basic principles, analytic and experimental methods or tools used in stress and deformation analysis are described, including brief sections on dimensional analysis, equations of motion and of equilibrium, principle of superposition, and strain energy methods.

Formulas for calculating the combined stress at a point are presented in Part III, comprising eight chapters. An introduction to the theory of the bending of straight or curved beams is given, along with formulas for shear, moment, and deflections of: beams and reactions in rigid frames; beams of great depth or width; beams subject to simultaneous axial and transverse loading; circular rings and arches. Shear lag, beams