

ditional difficulties in his stride and not let them distract him from his learning.

More and more, undergraduates in engineering and the sciences are taught courses in Algol. In the not-too-distant future, it is quite reasonable to assume that Algol will be used as the accepted description language of all computing processes, the way mathematics is the accepted description medium for natural processes. As a publication language, as a formal, unambiguous description of an algorithm, Algol is definitely far superior to any other medium. It is the only language accepted in the Algorithms Section of ACM Communications, the preferred language in many other publications.

After a thorough study of this book, one will not necessarily be able to write a good Algol program; this was not the intent anyway, at least for American readers, particularly since there aren't any Algol processors available for most American computers. However, one will be able to read and understand a published algorithm written in Algol and encode it in one of the available languages such as Fortran.

John E. Denes is Group Leader for Systems Programming in the Applied Mathematics Department at Brookhaven National Laboratory. Before joining BNL in 1961, he was in charge of the IBM 704 group of the Programming Research Section at Argonne. Mr. Denes received his BS (magna cum laude) degree in Physics in 1957 from CCNY. He is the author of several reactor codes for computers and of a (IBM 704) machine-language to machine-language translator (George). Since 1959 he has been a member of the Share Fortran committee and since 1963 chairman of the Share Direct-Coupled 7090/7040 project. A past president of the Long Island chapter of the Association for Computing Machinery (ACM), he is also a member of SIAM, MAA, AAAS, and of Phi Beta Kappa.

BRAINSTORMING AND OTHER TECHNIQUES

*Title Creative Synthesis in Design
Authors John R. M. Alger and Carl V. Hays
Publisher Prentice-Hall, Inc., 1964
Pages 112
Price \$2.95 paper; \$4.95 cloth*

Reviewer J. B. Godel

Creative Synthesis in Design is one of a series of eight design books published, or about-to-be published, covering such subjects as decision theory, engineering communication, reliability and studies of specific design problems. In *Creative Synthesis in Design*, the authors examine the subjective elements of problem solving in engineering.

They divide the design process into six sequential categories: recognizing the problem, establishing functional specifications, proposing solutions, evaluating alternatives, deciding upon a solution and, finally, implementing the decision. A "design decision table" is used to evaluate alternatives by rating each concept on how well it meets the requirements of the specification. An interest-

ing weighted scoring arrangement helps to point the way towards the best solution.

The authors believe that there are methods to stimulate creativity in problem solving. The first step (and perhaps the most difficult in the reviewer's opinion) is understanding the problem. Secondly, the problem solver must have cultivated a creative attitude, which is defined as one possessing self-confidence, constructive discontent, positive outlook, an open mind and the courage of his convictions. As to the methods of achieving the best solutions to design problems, it is suggested that existing knowledge and experience relating to the problem be studied as a prerequisite to individual and group creative effort.

The mechanics of individual and group creative effort is covered in sufficient depth to be useful to the reader. A morphological analysis of the problem outlining a systematic examination of possible solutions is presented with clarity. 'Brainstorming' as a tool for group inventiveness, in which many solutions are offered with no immediate consideration of their worth, is explained. The text provides a useful guide for conducting such a session. Final chapters are devoted to project planning and scheduling. Elementary descriptions of Program Evaluation Review Technique (PERT) and Critical Path Method (CPM) might be helpful to the novice.

Creative Synthesis in Design is not a lengthy volume. As such, it can do little more than survey the field and guide the interested reader toward further study. Abundant reference material is found in the bibliography. The book is well written in an unsophisticated style and, while its use to the practicing engineer is limited, it should be of special value to the engineering student.

J. B. Godel has been practicing design engineering for over 15 years. For the past 13 years he has been with Brookhaven National Laboratory designing remotely operated devices, reactor components, and experimental equipment for studies in high-energy physics, medicine and chemistry. Prior to BNL he designed packaging machinery for Union Bag and Paper Corp. He attended Polytechnic Institute of Brooklyn and Hofstra College (Long Island) and is a licensed professional engineer in the state of New York.

THERMAL STRESS AND STRENGTH

*Title Strength and Deformation in Nonuniform Temperature Fields
Author Ya. B. Fridman, ed.
Publisher Consultants Bureau Enterprises, Inc., 1964
Pages iv + 169
Price \$25.00
Translated from the Russian, 8 1/2 x 11 in.*

Reviewer Robert B. McCalley, Jr.

This book contains five chapters by different authors on problems of thermal stress and strength. Each chapter generally follows the form of a survey of the state of the

art and gives selected references to literature in Russian, English and German.

The first chapter by Ya. B. Fridman covers general problems of mechanical and thermal strength of materials, principally metals. Distinctions are made in the origin of loading (whether mechanical or thermal) and in four types of loading: shock, short-time, long-time and repeated. Topics discussed include: plasticity, creep, flaws, residual stress and fatigue.

The second chapter by E. M. Morozov and Ya. B. Fridman contains a useful summary of formulas for thermal stress in bodies with various configurations and thermal gradients. The formulas are largely for elastic bodies and include a number of less well-known formulas along with the familiar ones. Of particular interest are

- 1) a solution for a plate in the elastoplastic range and
- 2) a numerical example for a successive approximation solution of a tube in the plastic range.

Thermal fatigue and shock are surveyed in the third chapter by N. D. Sobolev and V. I. Egorev. The principal findings of numerous investigators are summarized, and numerical examples of fatigue life calculations are given for the approaches suggested by Coffin, Langer, and Manson.

The fourth chapter by B. F. Shorr develops the mathematical theory of creep and applies it to bars of arbitrary cross section and hollow cylinders.

The last chapter on thermal stability of plates and shells is by L. A. Shapovalov. The discussion covers flat and curved plates of rectangular planform, circular plates with and without a central hole, and a cylindrical shell.

The reader will find a number of useful ideas and methods in this book which may help with a particular thermal-stress problem. The second chapter with the compilation of solutions will probably be the most frequently used. A definitive treatise on thermal stress has yet to be written and probably will not be in the foreseeable future, since many problems of practical consequence involve elastoplasticity and fairly complex configurations. Practicing engineers will find this book a welcome increment to their knowledge of thermal-strength problems.

Robert B. McCalley, Jr. is Manager of Stress Analysis at Knolls Atomic Power Laboratory. He has been there since 1955, except for a year in which he was with the USAEC. Prior to that he was with Johns Hopkins. His field is structures (civil engineering), and he holds a BS degree (CE, 1947) from the University of South Carolina and Masters (CE, 1949) and PhD (1952) degrees from Cornell. He is a coauthor (with Prof. S. H. Crandall, MIT) of Chapter 28, "Numerical Methods of Analysis," in the Shock and Vibration Handbook (C. M. Harris and C. E. Crede, Editors).

POWER FROM ISOTOPES

Title Radioisotopic Power Generation
Authors William R. Corliss and Douglas G. Harvey
Publisher Prentice-Hall, Inc., 1964
Pages xi + 304
Price \$14.75
One of Prentice-Hall's Space Technology Series

Reviewer Robert F. Cooper

Radioisotopic Power Generation covers comprehensively the design of radioisotope generators from fuel selection to actual applications. The material included in this book has not previously been collected into any single book of which I am aware.

In general, the book is excellent in its scope and an infinite improvement over what was previously available. It comprises a complete history of radioisotopic generators. The most informative chapters are those dealing with generator design, nuclear safety and nuclear batteries. Most of the remainder of the text is quite adequate.

However, major improvements could be made in the important areas of energy conversion, thermal applications of isotopes, and advanced concepts. The area of energy conversion was glossed over too lightly and should have been given more detailed coverage. The thermal applications of radioisotopes would also have been a very significant addition to this book. Certainly detailed coverage of *Poodle* and *Snapoodle* concepts should have been included—perhaps under advanced concepts.

The constantly changing area of isotope availability and costs is handled as well as possible. For proper planning, this area should not be considered inflexible or limiting. (It is encouraging to see the very practical unit of thermal watts becoming more generally used in reference to the availability and production of radioisotopes).

In summary, this text is an excellent first attempt to bring together closely related but previously widely dispersed information in this important field. As such it is a valuable reference. However, strengthening the chapters mentioned and the addition of the Soviet information released at Geneva this past summer would have improved the text.

Robert F. Cooper is Technical Manager of the Physics Group of the Aerospace Power Division, Wright-Patterson Air Force Base, Ohio. In this capacity he is responsible for investigating and evaluating advanced energy storage and/or conversion concepts and related technology. As such, he is currently directing the USAF portion of the Poodle programs undertaken jointly with the USAEC. He holds a MS degree in nuclear engineering from the Air Force Institute of Technology.