

This book presents, in a condensed form, a phenomenological description of friction. The author, beginning with a brief description of mechanical properties of materials and the various strength properties associated with materials, covers in an informal manner the various aspects of wear, friction, adhesion, and lubrication.

These topics are more than adequately covered and illustrated with helpful sketches; much of the viewpoint is substantiated through the use of many graphs. Of special interest to the readers of this journal might be the coverage of the use of radioactive tracers to follow the wear process.

What is disappointing and not covered to any extent is the role that modern research techniques, such as low-energy electron diffraction, have played in unraveling many of the features of surfaces. The use of this technique, as well as others, could be quite helpful in bringing a more theoretical viewpoint to this subject.

If one wishes to have an up-to-date book on the phenomenology of friction, this book, in spite of its outlandish price per page, would be quite helpful, but it cannot serve as more than a text; i.e., it is not a research volume.

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ESPECIALLY FOR ENGINEERS

Title Defects and Failures in Pressure Vessels and Piping

Author Helmut Thielsch

Publisher Reinhold Publishing Corporation, 1965

Pages xviii + 427

Price \$15.50

Reviewer Robert Baldwin

Having spent the last several years working on the design, construction, and inspection of the process systems for a reactor, I found this a most pertinent book.

The book has the thesis that, in most cases, defects can either be avoided by proper design or can be detected and eliminated prior to placing equipment in service. To this end, just about every conceivable failure is discussed from the viewpoint of cause, detection, and prevention.

Had I studied this book five years ago, some rather painful experiences might have been avoided, others better understood, and some of our equipment would

have been more confidently designed. Perhaps it is because the author speaks so directly to my experience that I feel this is a worthwhile book; but I doubt that my experience is unique. In any event, there has been a need for some time for a book that deals, from the engineer's point of view, with all the various aspects of materials for process equipment.

If you have ever had a pipe or vessel failure, the odds are that in this book you will find why the failure occurred and how it could have been avoided. Also, you will be relieved to find that you can get your information without the assistance of an interpreter to translate specialist's jargon. It is all there in plain, straightforward language with thoughts organized in a logical manner.

At no time did I feel that what was being discussed was really just theoretical stuff and of interest only to the researchers, the metallurgists, or the welding engineers. I was reading about my world, the world in which an equipment failure puts others out of work, and might even endanger the physical well-being of a number of people. In case the reader's experience does not supply examples of failures, the author gives examples of failures and their consequences in the most sparse and undramatic language. The understatement is very effective and the moral clear, though unstated.

For all its virtues, this is no book for the overly cautious engineer. The thought of all that could go wrong with piping, so ably documented, would drive him from the field.

Robert Baldwin is a Mechanical Engineer assigned to Brookhaven National Laboratory's High Flux Beam Reactor (HFBR) Project. He has held this position for the past six years. Prior to this, he worked with the LMFR Project at BNL. Baldwin came to Brookhaven from AMF where he spent eight years as a Development Engineer and Product Engineer working on a variety of tobacco processing machinery, radar, and ordinance equipment. His engineering education was received at West Virginia University and in the Navy V-12 program at MIT.

A LOT ABOUT PRACTICALLY NOTHING

Title Practical Vacuum Techniques

Authors William F. Brunner, Jr. and Thomas H. Batzer
(Sponsored by USAEC)

Publisher Reinhold Publishing Corporation

Pages x + 198

Price \$8.25

Reviewer George H. Bancroft

There have been several books on vacuum techniques written at various technical levels for the engineer and the research scientist, but, until the publication of the present volume, the needs of the technician have been largely ignored. His background is usually mathematically limited, and his interest in the laws governing his work is in applying them as needed, rather than in their derivation. He does need to know the meaning of the various terms concerned, the units in which they are measured, and something concerning the limitations of their use.

In their first chapter, the authors have succeeded in concisely presenting, defining, and illustrating the principal relations governing the behavior of gases as they pertain to vacuum technique. Having once read this material, the reader will find it a convenient reference as the need arises. The concepts of the mean free path, the types of gas flow, volumetric and mass flow, conductance of pipes under viscous and molecular flow, and pump-down rate are well illustrated and explained quite simply, but adequately, for the authors' purpose.

The chapter on the "Components of a Vacuum System" gives a good description of typical commercially available hardware, as well as a description of the principles on which each type operates. The discussion of ports, lead-ins, and motion seals describes several types that have been designed, built, and used many times, but which may not necessarily be commercially available.

The discussion of "Techniques and Procedures" presents the problem of putting components together to attain a complete system having the desired performance characteristics. The interrelation of the parts of the system is emphasized. Sample calculations for the selection of components are carried out showing how they are selected. Leak detection and leak detectors are logically introduced at this point. The operation of the mass-spectrometer leak detector and the initial operation of a typical system are given in such detail that they become general operating instructions. Estimates of performance of the sections of the equipment are given for the guidance of the technician in determining if there is trouble and where it may be. All through the discussion little details of a system assembly are pointed out, such as the manner of mounting gauges and arranging for trapped volumes to be pumped, providing ports for the connection of a leak detector to the system, and the like. These items are each rather small in themselves but add to the overall performance of the system and the convenience of working with it. These techniques are frequently overlooked even by experienced people because they are in the nature of details. The treatment of "Ultra High Vacuum" emphasizes those elements of construction that are different from those used for the high-vacuum region and explains the factors that necessitate the difference in approach. Practical differences are pointed out with regard to joints, lead-ins, motion seals, outgassing, backstreaming, and pumping speed.

The last chapter deals with the properties of materials used in vacuum systems. A great many different materials, from pure metals, alloys, and insulators to plastics and elastomers, are noted with very pertinent comments on their advantages, disadvantages, and par-

ticular properties. For the vacuum expert there is little that is new, but for the beginning technician this review should be very valuable, both immediately and for future reference.

The appendixes are quite extensive, ranging from the metric system and temperature scales to a table of cements and adhesives and their properties; also included is a very good discussion of soldering and brazing materials and techniques, and an extensive vapor-pressure table, and an excellent presentation of flange, gasketing, and welding design giving general dimensions. Much of this material appears scattered through the literature but has not been brought together in one place.

The beginning vacuum technician should find this volume very helpful in his daily work and should make it easier for him to tackle the more advanced books.

George H. Bancroft is a Senior Staff Scientist with the Pioneer-Central Division of The Bendix Corporation in Davenport, Iowa. He has been connected with the vacuum equipment industry for more than 20 years and has had considerable experience in the training of engineers and technicians for vacuum work. He is Past President of the American Vacuum Society. He received his AB and MS degrees from West Virginia University, and his PhD from the University of Pennsylvania.

ONLY AN INTRODUCTION

Title Radiation Effects in Electronics

Publisher American Society for Testing and Materials

Pages 236

Price \$5.00

Reviewer Richard F. Shea

The contents of this book resulted from a joint effort of ASTM Committee E-10 on Radioisotopes and Radiation Effects and the Niagara - Finger Lakes Section of the American Nuclear Society. It consists of the major portion of the transactions of the Joint ANS-ASTM Conference on Radiation Effects in Electronics held in Syracuse, N.Y. from October 5-7, 1964. It includes an Introduction, 12 papers on various aspects of radiation-induced phenomena in electronic devices and circuits, and remarks on correlation studies.

The papers describe radiation effects on materials, devices (such as bipolar and field-effect transistors, solar cells, diodes, and traveling-wave tubes), and complete electronic equipment. As would be expected, the majority of the papers deal with radiation effects on semiconductor devices.