

Handbook of Engineering Fundamentals, edited by O. W. Eshbach and M. Souders, 3rd edition, 1975, \$29.95, 1962 pages, published by John Wiley & Sons.

REVIEWED BY DONALD F. HAYS¹

This third edition of *Handbook of Engineering Fundamentals* is a revised version of a volume with which many of us are familiar. For those who used the first or second edition in school or in their professions, this new edition and its contents will certainly not look unfamiliar. It will, however, appear larger than previous editions as its content has been changed and expanded with the times. As we know, the last few decades have witnessed many accomplishments in the engineering profession. As new knowledge is obtained and incorporated into the teaching of engineering, handbooks must change so as to reflect the needs of the engineering profession.

Before discussing the contents of this book, it should be understood that it is, as the title states, a handbook of "Engineering Fundamentals." It contains subjects which are common to engineering science. The intent is for the user to complement this handbook by other volumes which are related to the various branches of engineering. The purpose of this volume is to summarize as concisely and clearly as possible the basics or fundamental elements of engineering and still be of such a size as not to be unwieldy. To this end, the reviewer feels that this reference book is extremely successful. It is obvious that all "basics" cannot be included in one volume but the reader will find a multitude of disciplines covered in some detail.

The various sections included in this handbook are as follows (1) mathematical and physical tables, (2) mathematics, (3) physical units and standards, (4) mechanics of rigid bodies, (5) mechanics of deformable bodies, (6) mechanics of incompressible flow, (7) aeronautics and astronautics, (8) engineering thermodynamics, (9) electromagnetics and circuits, (10) electronics, (11) radiation, light and acoustics, (12) heat transfer, (13) automatic control, (14) chemistry, (15) engineering economy, and (16) properties of materials. These are the major sections of the handbook and a detailed table of contents appears at the beginning of each of the sections.

As was mentioned earlier, updated versions of handbooks come about to meet the needs of changing times. In the Mathematics section, this change is seen in the inclusion of a section on Fortran programming. Computer usage over the last decade has become a part of engineering education, and should be reflected in handbook content. In a like manner, we find set algebra and statistics and probability included in the mathematics section.

Because of the conversion to International System (SI) units in the United States, it was thought that the handbook should reflect these

changes. However, SI units were mentioned only briefly. Perhaps this is understandable since the handbook was published about the time that the new system of units was being put into effect.

In terms of Tribology, what fundamentals are covered by this newest edition? In the section "Mechanics of Rigid Bodies," there is a small section on the subject of friction. Two pages are devoted to a discussion of nonlubricated axle friction, lubricated journal friction, and boundary friction. These two pages are inadequate to give the fundamentals of film and boundary lubrication which are so important in our world today. Although there is much in the literature dealing with lubrication fundamentals, none of these tribological references are given at the end of this section. The reviewer feels that this subject should have been given greater emphasis even if it only meant the addition of pertinent references to the literature.

The section on "Incompressible Fluids" has one page on the "theory of lubrication." The example is a slider bearing of infinite width. This simple illustration does provide the reader with some idea of how hydrodynamic lubrication problems can be solved. It is again unfortunate that there are no references given to the multitude of books which treat fluid film lubrication.

It should be pointed out that although Tribology as a discipline is treated only slightly, there is a wealth of information in these sections that would be of interest and value to practicing engineers (tribologists).

Although some sections of previous editions have been revised and updated to include new material, there have also been new sections added to the book. There is a very large section on Aeronautics and Astronautics which reflect the needs of this decade. Included are material on inertial navigation, orbital mechanics, flight dynamics, modern control theory, magnetogasdynamics, radiation gasdynamics, aerodynamics and aerospace propulsion.

In addition, there are new handbook sections on electronics, heat transfer, automatic control and engineering economy. There is also an updated section on chemistry and a large section devoted to the properties of materials.

Each of the major sections of this handbook cover a multitude of subjects. Although it would not be practical to list all of these for the reader, it would perhaps be sufficient to consider the section on "Mechanics of Rigid Bodies." It is introduced by a page of definitions which is followed by eight sections dealing with the subject of "Statics." This is followed by six sections in the area of "Kinematics," 10 sections dealing with "Kinetics," and then five sections under the heading "Friction." Other major sections of the handbook have been presented in a manner similar to this so that the user should have little difficulty in finding the information that he needs.

The type was found to be clear and the illustrations, including charts, were very good. It is a well bound volume with good quality paper. For a 2-1/4" (57.15 mm) space on the bookshelf, the student, teacher or practicing engineer could hardly expect to find a more compact set of engineering fundamentals.

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