
BOOK REVIEWS

Chapter 1 is unusual in referring to *corporate culture*. Blanchard contends that each corporation has a culture of its own. A table gives the items that can be evaluated. The author states: "Corporate culture is a composite reflection of the value set. This is established by the founders, and modified or reinforced by the company leaders who follow."

Planning in Chapter 2 is very complex because there are so many starting points for projects. The usual physical designs and facilities are often affected by environments and consideration of types of labor. In complex corporate structures, there may be internal competitive influences. There must be goals. A plan must have objectives with direction.

The Prologue of Chapter 3 states that organizations are dynamic, while organization charts are static. Proper organizations provide the composite of skills needed to accomplish the goals. All the facets of authority, responsibility, accountability, and delegation must be evaluated.

Chapter 4 on Staffing discusses selection of people. The problem is matching the person to the job. When people in the organization are not suited to a particular phase of the operation, an external contractor may be selected, either on a temporary basis or on a long-term contract.

When a project is underway, Chapter 5 says it "does not self-control." Obviously, projects that are overbudget or overschedule were not controlled. Controlling problems involves establishing where they took place so that all errors can be corrected. Controlling is a process, not lines on a chart. An essential element is feedback of results or a status evaluation to the makers of decisions. A process information diagram illustrates a way of handling communications between groups. A major phase of control is quality control. In addition to controls within the operating project, controls are needed over outside operations such as involve vendors, engineers, contractors, and consultants. Controls are also needed over safety, sanitation, health, and welfare.

In Chapter 6, the very large project called *megaproject* that is in the billion dollar range is described and its special problems outlined. A major consideration is local support. During planning, special interest groups must be identified, such as labor unions, small business groups, and environmentalists, as well as areas such as utilities, transportation, communications, and housing.

Since projects do not function as planned in many cases, Chapter 7 discusses Managing the Troubled Project. A well designed system will reveal changes that are early warnings of deviation from the desired results. A list of eleven items is presented for which documentation will aid in establishing the revised operation that eliminates poor results.

The book closes with an Appendix on Contractor Evaluation. The most important aspect of contractor performance is the competence of its personnel. Good project management is a team effort in which the team consists of all groups that have an influence on the production of the goals of the corporation or individual operation.

The reviewer questions the need for the book's high price, and feels that the book would help many people who are in lower income brackets or students in school.

Experimentation and Uncertainty Analysis for Engineers

Reviewed by Timothy L. Jacobs, Department of Civil and Environmental Engineering, Duke University, Durham, NC 27706.

REFERENCE: Coleman, H. W. and Steele, W. G., Jr., *Experimentation and Uncertainty Analysis for Engineers*, Wiley, New York, 1989, \$44.95.

The stated objective of this book is to present "a logical approach to experimentation through the application of uncertainty analysis." The book is intended for upper level undergraduate and graduate courses and as a reference. Its examples and discussions are geared towards mechanical engineering problems and experiments. In addition, the book may be used as a reference for quantifying sources of error within an experimental process.

The book opens with a discussion of the sources of experimental error and the use of uncertainty analysis in assessing experimental error. This is followed by an introduction to statistical concepts and methodologies and a discussion of the measurement of uncertainty. In this section, the authors introduce the basic concepts of random variables, statistical distributions, sample mean and standard deviation, confidence intervals, and error estimation. The introduction of statistical concepts is not exhaustive and focuses on only those concepts most useful to experimental uncertainty analysis.

Following the introduction of basic statistical concepts and tools, the authors discuss the propagation of uncertainties, the application of general uncertainty analysis, and the use of uncertainty analysis in planning experiments. This section is very well written and is complemented by several illustrative and well documented examples. One attribute of this section is that each of the examples is presented and thoroughly explained in a meaningful manner to the reader.

The following three sections focus on the design of an experiment using detailed uncertainty analysis and the debugging and execution of an experiment. This book clearly distinguishes between bias errors and precision errors and provides illustrative examples of both. In addition, the authors discuss such topics as digital instrument errors and the dynamic response of instrument systems. Debugging and the execution of experiments are presented in the context of a heat transfer experiment with an emphasis on the replication of experimental results.

The final chapter presents a limited discussion of data analysis and the presentation of experimental results. Its main emphasis is on linear and multiple linear regression analysis. In addition, a brief description of standard errors in curve fitting is presented.

In general, this book is well written and easy to understand. The examples presented throughout the text are well documented and clearly illustrate the authors' point. Although the authors state that this book can be used as a text for upper level undergraduate and graduate classes of all engineering disciplines,

BOOK REVIEWS

the true value of this book is as a reference for experimentalists and their research assistants. From a pedagogical standpoint, the sections of this book that discuss the use of statistical methods and tools are not comprehensive and would require the use of supplemental materials if used as a required text in a course. However, as stated earlier, this book provides an excellent laboratory reference for experimentalists already familiar with the basic concepts of uncertainty and statistics.

Inherently Conducting Polymers

Reviewed by Gary Burnell, Ibstock, Leicestershire, U.K.

REFERENCE: Aldissi, M., *Inherently Conducting Polymers: Processing, Fabrication, Applications, Limitations*, Noyes Data Corporation, Noyes Publications, Park Ridge, N.J., 1989, \$39.

The feasibility of electrically conducting polymers was explored theoretically in the 1960's but has been the subject of serious research only over the past decade or so. Dr. Aldissi's book reviews the progress of this research and describes the current state of the art. Various aspects of the subject are covered such as synthesis, properties, and applications, with the author adopting a mainly descriptive style.

After a Foreword and short Introduction defining the scope and objectives of the book there is an extensive section on the Synthesis of Conjugated Polymers. These are basic to polymer conduction, and the variety of techniques available for synthesizing them is wide, probably justifying the amount of space devoted to the topic. Most candidate materials are included, for example, poly(paraphenylene), poly(phenylene sulfide), and polyaniline. However, polyacetylene $[(CH)_x]$ is given prominence, being the first extensively characterized organic covalent polymer; it is also used as the benchmark reference throughout the book.

Methods of synthesis are followed by a short section on the Electronic Structure of Conjugated Polymers in which Dr. Aldissi describes the need for a network of overlapping intra- or inter-molecular orbitals to create significant electron or hole mobility, thus providing the basis for conduction. He goes on to say that in practice electron mobility is minimal in most organic polymers and therefore must be stimulated by further processing, using a technique known as doping. This involves the oxidation or reduction of the polymer by electron acceptors or donors to produce either *p*-type or *n*-type conductors respectively. The various routes for producing both types are briefly described, together with a short, necessarily speculative, discussion on the doped structure; this area is still being researched. The narrative

evolves to explain how conduction characteristics can be tailored to match those of a semi-conductor or a metal by varying the concentration and type of dopant. The Magnetic Properties of the doped polymers are also discussed, with reference to electron spin resonance (ESR) and magnetic susceptibility.

One of the strengths of the book is its impartiality, despite the author's understandable enthusiasm for the subject. It manages to address both the advantages and disadvantages of these new materials without bias. For example, research has shown that potentially the most serious obstacle to the wider application of conducting polymers is their stability. It turns out that the conjugated structure whilst facilitating conduction is also responsible for instability, particularly in the presence of water; this is true for both pristine and doped polymers. The book deals with the various aspects of the problem in terms of stability in air, thermal stability, and the influence of structure on stability. Progress in the development of stabilizing techniques such as ion implantation, co-polymerization, and the use of crown ethers is also discussed. I feel this section is of particular value, since it puts the current status of these materials into sharp perspective.

Although undesirable, instability in the presence of water can be put to advantage in the construction of a polymer fuel cell. This is only one of several potential applications identified and described by Dr. Aldissi. Others include photoelectrochemical solar cells, electromagnetic shielding, and electronic circuit boards. However, I suspect that in the authors view the most promising area for development is rechargeable polymer battery technology, since several pages and an Appendix are devoted to it. The efficiencies and technical feasibility of a number of different battery systems are reviewed including lithium-reduced polyacetylene, a leading contender. On a cautionary note the change in potential during charging or discharging is highlighted as the main problem with polymer batteries at present.

In general, I found the text well written, clear, and concise. Although the intended audience is not declared, I feel the most appreciative is likely to be the materials scientist looking for a good basic introduction to the subject. Most factual details are supported by one or more references and therefore can be followed up in greater depth if required. I have to admit that I found the format of the book rather unusual in that it is effectively a research report in a hardback cover, bearing witness to its pedigree. Unfortunately, the photo, print, and paper quality are rather poor, all of which belie the quality of the content. In their defence the publishers do say that a few corners have been cut to expedite publication and keep down the price, but I am not sure the trade-off was worthwhile. However, this is a matter of personal preference and the reader should not be put off by these matters from what is a very useful contribution to the knowledge base.