tional aspects of HF, representing several distinct viewpoints and shades of opinion, with numerous "war stories" from different firms in the consumer-durables and capital-goods industries.

Experimentation and Uncertainty Analysis for Engineers, Hugh W. Coleman and W. Glenn Steck, Jr., John Wiley and Sons, Inc., 1989, 205 pages, $44.95.

Reviewed by Franklin C. Hurlbut[6]

In these times, when design is routinely facilitated by computational aids, it can be forgotten that so much of our informational requirement lies at the edge of known technology. We may, perhaps, be dependent on knowledge of materials or fluids properties which have come to us only recently from experiment, or, as a more challenging prospect, we may be dependent upon experiments which we ourselves will perform. How reliable are these new data in terms of standard uncertainty measures? Or, on the other hand, how reliable will be the data from our proposed experiment, and how can we design to minimize experimental uncertainties? These are questions which have been addressed in a number of texts, but it is good to have available a modern book which takes a fresh and readable look at these important issues.

This book is designed to serve as a text at upper undergraduate levels and also, with supplemental materials, as a graduate text. The approach coordinates with the ANSI/ASME Standard on Measurement Uncertainty, recently issued by the ASME, 1986, and draws substantial background from standard papers and reference works. Following the development of basic statistical concepts and formulations, the authors discuss the analysis of error propagation as an important element of experimental planning, and move, Chapter 4, to the use of detailed uncertainty analysis in experiment design. These discussions are effectively supported by example. The book is particularly useful in its discussion of the propagation of measurement bias error into experimental results. This aspect of uncertainty analysis is often glossed over in texts, and, while the propagation of precision errors may be well treated, the status of experimental uncertainty in the presence of bias remains clouded. Here the authors' presentation is clear and helpful. The book continues with information on the selection of test points, on the order of testing, and on the graphical presentation of results.

Experimentation and Uncertainty Analysis for Engineers focuses very closely on the design of laboratory engineering experiments. It is written to be easily read and understood. Unfortunately it omits statistical materials of value including discussions of binomial or of poisson distributions, or of the chi-squared test and its applications. There is no question that for many applications the level and content will be entirely suitable.

Intelligent Manufacturing Systems, Andrew Kusiak, Prentice-Hall, Inc., 1990, 443 pages.

Reviewed by David Dornfeld[7]

This book attempts to integrate design and management issues (actually process planning, scheduling, and machine layout) with automated manufacturing. It is much stronger, because of the author's background in coverage of the "management issues" than the design or manufacturing automation. The early chapters familiarize the reader with some very basic aspects in computer-integrated manufacturing including the interaction of a host of acronymns, CAD, CAPP, CAM, CAQC, ASR. They also present some classic features of layouts of flexible machining and assembly and tool management. This material is to be considered more as definition of terms for further chapters rather than information as it is very shallowly discussed. What follows then, with the exception of a chapter on designing mechanical parts and mechanisms which suffers from the same light treatment, is a rather comprehensive review of knowledge based systems (KBS) and knowledge acquisition. After the primer on these KBS the author steps us through a series of chapters that go into increasing detail on process planning, group technology, machine layout, and scheduling. The chapters are arranged to cover first the basic topic and then in the chapter immediately following the "knowledge-based systems" implementation of the objective—for example: knowledge based system for scheduling in automated manufacturing. These chapters are complete with detailed presentation of algorithms, examples, and substantative homework exercises. These are in striking contrast to the first introductory chapters. All chapters have generous bibliographies included.

As a book attempting to cover material for a broad range of professionals with various experience levels, the book falls somewhat short. The latter chapters are too narrow and deep for a reader "interested in exploring the fundamentals of modern trends in manufacturing design and management" (from the preface). Early chapters are too broad. However, for industrial engineers/system engineers it would be a very valuable book.

Mechanical Impact Dynamics: Rigid Body Collisions, Raymond M. Brach, Wiley-Interscience, 1991, 10 chapters, 260 pages.

Reviewed by Werner Goldsmith[8]

This volume integrates the author's theoretical research during the last fifteen years with the analytical and experimental work of others. It is an innovative and wide-ranging, although highly controversial, treatment of the topic most aptly described by its secondary title; the label "Impact Dynamics" appears to be redundant. The coverage is far greater than anything published to date in this area and includes many numerical examples; however, as stated, this treatment cannot determine forces or stresses. The presentation is mostly at the level of a first course in mechanics, although the new and advanced topic of chaos is also included. When feasible, the organization of the volume is arranged to present system and solution equations; the treatment is geared to matrix usage and computer manipulation.

The first four chapters describe the basic relations of mechanics, two- and three-dimensional particle collisions, and the empirical parameters describing energy losses generated by the normal and tangential motions, including limiting values. Chapters 5 and 6 deal with planar impact of rigid bodies, the latter involving contact with a massive object (barrier) whose effect is replaced by impulses; Chapter 7 extends these concepts to three-dimensions. The remaining sections are more specialized and are frequently presented by example. Chapter 8 treats collisions of rigid linkages and articulated bodies, while Chapter 9 discusses topics involving vibratory impact phenomena. Chapter 10 is concerned with aircraft and vehicular collisions, data for the latter being obtained from a series of controlled impacts for four different vehicle orientations. Sim-

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This book will be useful to engineers and scientists from all disciplines tackling all kinds of manufacturing, product and process quality problems and will be an ideal resource for students of this topic. Contents: Introduction to industrial experimentation. Some fundamental and practical issues in industrial experimentation. Fundamentals of Design of Experiments. Basic principles of Design of Experiments, Degrees of freedom, Confounding, Design resolution, Metrology considerations for industrial designed experiments, Selection of quality characteristics for industrial experiments. Understand