

# Preface to Second Edition

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Engineering design concerns us all. It affects our everyday lives and increasingly affects the future of life on this planet. The time has gone when design engineers were told what was required and did their best to come up with something that worked. Competition is fierce, markets are international, and the consequences of poor design are felt globally. There is strong pressure for shorter project timescales and higher quality design at lower cost. Designs must work, they must be culturally and politically acceptable, and they must be safe, reliable and environmentally sound. A failure in any one of these aspects can result in bankruptcy or disaster, and to avoid such debilitating situations the design engineer needs the genuine support of all parties involved: management; marketing; manufacturing; customers and users. It is no longer acceptable for design engineers to work in isolation from everyone else, and it is no longer acceptable for everyone else to plead ignorance of the design engineer's work. We are all involved with design and we all have a responsibility to make sure that design is done in the best possible way.

So what is the role of a design engineer? A design engineer is presented with a technical problem or need, and the ultimate aim is the conversion of this into the information from which something can be manufactured at high enough quality and low enough cost to overcome the problem or to meet the need. This may sound simple, but in fact so many factors influence the situation that it is often difficult for one person to understand the problem fully, let alone produce solutions that meet everyone's expectations. Design is a team activity. Communication and information exchange are critical.

The manager responsible for engineering design must understand the problem or need in its overall context, must be able to build up a strong working team within that context, and must be able to steer the project through the design process to the point where manufacture is in progress. From then on there is a reduced, but important, responsibility to monitor the performance of the design in practice and ensure that it continues to satisfy customer and user needs throughout its life. Feedback of performance information is essential for future development.

It is not possible to cope with all the issues using an "inventor" approach to design, neither is it necessary. We now know enough about the design process, the working of teams, and the communication of information to be able to tackle a design project in a systematic and confident manner. The rapid advances in computing and communication technology during the decade since the first edition of this book was published have enabled the implementation

of approaches to engineering design that have long since been developed, but which have lacked the practical means for delivery. The use of Web-based design aids and geographically dispersed design teams has become a reality, and it is now possible to work in ways that would not have been considered a few years ago. There is little excuse for poor design.

This book brings together some guidelines for the management of engineering design projects within a Web-based framework that encourages a systematic approach to design. It is based on the results of experience in industry combined with the results of academic design research, and it includes a unique series of checklists and work sheets for direct application on projects. The checklists pose a structured set of questions for the design manager to use during each phase of the design process, and the work sheets provide a means for summarizing the project status at any particular time. They can be used before or during design review meetings to highlight action items and, when collected together, they form a historical record of project progress.

Many people offered suggestions and encouragement during the original development of this book, but there are two in particular whose invaluable help must be especially acknowledged. Firstly there was Ken Wallace, Professor of Engineering Design at Cambridge University in the UK. It was Ken who, in the early 1980s, translated the systematic engineering design approach as presented by Professor Pahl and Professor Beitz in Germany. This has become our cornerstone for both design teaching and design practice. Secondly there was Tom Zabinski, of the Graphics Communication Department at Triodyne Inc. in the USA. It was Tom who spent many long hours making the complicated diagrams more understandable to the reader and laying out the checklists and work sheets in a practicable form, which ultimately could be converted to a Web-based system.

We selected the Life chair, designed by Formway in New Zealand but manufactured and marketed by Knoll in the USA, to provide a working example of successful product design. The help of both companies is gratefully acknowledged, and in particular the enthusiastic involvement of Jon Prince, Design Team Leader for the chair project. We would also like to thank Katherine Vyver and Andrea Roberts from Formway Design for providing final images and proofreading sections of the text. A detailed review of the project was undertaken, and its history was reconstructed chronologically by questioning according to the checklists. The checklists were used in the same order as presented in this book, and the corresponding work sheets were filled out as the reconstruction took place. The result was a set of completed work sheets that have been used as examples in sequence throughout this book.

The Triodyne Safety Information Center provided help with the research on standards and codes, and a set of five reference papers written by Triodyne staff laid a foundation for the text. The help of Marna Sanders is acknowledged in bringing together current information with regard to the sourcing of relevant standards and codes for engineering design. Using the Triodyne facilities, she was able to compile a useful bibliography on standardization and a compre-

hensive international list of Website addresses for obtaining standards and codes.

There are now many helpful books available on the management of projects, on the engineering design process, product design, concurrent engineering and specific design techniques. However, when it actually comes to managing an engineering design project within a company, circumstances often make it difficult to apply all but the simplest techniques. There are some subtle day-to-day issues that are time consuming, frustrating and difficult to handle, yet which have not been addressed adequately in the literature. They are sometimes referred to as the “hidden costs of design.” What has been attempted here is to present a systematic and practical approach to handling such issues by considering first the context within which the design work will take place, then the nature of the project, the design team and the available tools, and then each phase of the design process itself. As the book is intended to complement texts on project management, design methods, and specific areas of design, references are given and further reading suggestions are provided in the Bibliography. The underlying idea is to help the design manager operate effectively and efficiently by integrating multidisciplinary viewpoints and coordinating the design process at every level within a company. If it helps to improve the quality of our engineering design for the future then it will have done its job.

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