



## Mechanical Design, Second Edition

By K. Maekawa, T. Obikawa, Y. Yamane, T.H.C. Childs

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**Mechanical Design, Second Edition** By K. Maekawa, T. Obikawa, Y. Yamane, T.H.C. Childs

This book introduces the subject of total design, and introduces the design and selection of various common mechanical engineering components and machine elements. These provide "building blocks", with which the engineer can practice his or her art.

The approach adopted for defining design follows that developed by the SEED (Sharing Experience in Engineering Design) programme where design is viewed as "the total activity necessary to provide a product or process to meet a market need." Within this framework the book concentrates on developing detailed mechanical design skills in the areas of bearings, shafts, gears, seals, belt and chain drives, clutches and brakes, springs and fasteners. Where standard components are available from manufacturers, the steps necessary for their specification and selection are developed.

The framework used within the text has been to provide descriptive and illustrative information to introduce principles and individual components and to expose the reader to the detailed methods and calculations necessary to specify and design or select a component. To provide the reader with sufficient information to develop the necessary skills to repeat calculations and selection processes, detailed examples and worked solutions are supplied throughout the text.

This book is principally a Year/Level 1 and 2 undergraduate text. Pre-requisite skills include some year one undergraduate mathematics, fluid mechanics and heat transfer, principles of materials, statics and dynamics. However, as the subjects are introduced in a descriptive and illustrative format and as full worked solutions are provided, it is possible for readers without this formal level of education to benefit from this book. The text is specifically aimed at automotive and mechanical engineering degree programmes and would be of value for modules in design, mechanical engineering design, design and manufacture, design studies, automotive power-train and transmission and tribology, as well as modules and project work incorporating a design element requiring knowledge about any of the content described.

The aims and objectives described are achieved by a short introductory chapters on total design, mechanical engineering and machine elements followed by ten chapters on machine elements covering: bearings, shafts, gears, seals, chain and belt drives, clutches and brakes, springs, fasteners and miscellaneous mechanisms. Chapters 14 and 15 introduce casings and enclosures and sensors and actuators, key features of most forms of mechanical technology. The subject of tolerancing from a component to a process level is introduced in Chapter 16. The last chapter serves to present an integrated design using the detailed design aspects covered within the book. The design methods where appropriate are developed to national and international standards (e.g. ANSI, ASME, AGMA, BSI, DIN, ISO).

The first edition of this text introduced a variety of machine elements as building blocks with which design of mechanical devices can be undertaken. The approach adopted of introducing and explaining the aspects of technology by means of text, photographs, diagrams and step-by-step procedures has been maintained. A number of important machine elements have been included in the new edition, fasteners, springs, sensors and actuators. They are included here. Chapters on total design, the scope of mechanical engineering and machine elements have been completely revised and updated. New chapters are included on casings and enclosures and miscellaneous mechanisms and the final chapter has been rewritten to provide an integrated approach. Multiple worked examples and completed solutions are included.

- \* New chapters on casings and enclosures, springs, and fasteners
- \* New information on important machine elements such as sensors and actuators
- \* Clear explanation of the total mechanical design process through the use of text, photographs, diagrams, step-by-step procedures and case studies

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## **Editorial Review**

### Review

Comments on textbook questionnaires from previous edition:

'Good general text for Mechanical Engineering Design courses. In depth look at gears, shafts, bearings, etc. '  
'Excellent for detailed design studies.'

'An excellent txt to help students design specific components for a particular design application. This book is an excellent source of procedural and theoretical information. Highly recommended.'

### From the Back Cover

Now published in its second edition this book concentrates on developing comprehensive skills for the design and selection of common mechanical engineering components and machine elements. It is an ideal guide to the subject of total design for students of mechanical design and mechanical engineering.

Key features of this fully revised and expanded edition:

- 1) New chapters on casings and enclosures, springs, and fasteners
- 2) New Information important machine elements such as sensors and actuators
- 3) Clear explanation of the total mechanical design process through the use of text, photographs, diagrams, step-by-step procedures and case studies

Mechanical Design provides descriptive and illustrative information on principles and individual components to highlight the detailed methods and calculations necessary to specify, design, or select a component. Worked examples and solutions are supplied throughout to help the reader develop these skills to be able to repeat calculation and selection processes with confidence.

Peter Childs is the Director of the Rolls-Royce University Technology Centre at the University of Surrey

Also available from Butterworth-Heinemann:

Materials Selection in Mechanical Design, second edition, Ashby, 0 7506 4357 9

Materials and Design: The art and science of material selection in product design, Ashby and Johnson, 0 7506 5554 2

### About the Author

Peter Childs is Professorial Lead of Engineering Design at Imperial College London, and was previously director of the Rolls-Royce supported University Technology Centre for Aero-Thermal Systems and a professor at the University of Sussex. He has spent the last 20 years actively involved in industrial research and development, with projects including work for Ford, Rolls-Royce plc, Siemens, Alstom, DaimlerChrysler and Volvo. He is a fellow of the Institution of Mechanical Engineers and in 1999 was the winner of the American Society of Mechanical Engineers International Gas Turbine Institute John P Davies award for exceptional contribution to the literature of gas turbine technology.

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