



Computer-Aided Manufacturing (3rd Edition)

By Tien-Chien Chang, Richard A. Wysk, Hsu-Pin Wang

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Using a strong science-based and analytical approach, this book provides a modern description of CAM from an engineering perspective to include design specification, process engineering, and production. The Third Edition of *Computer Integrated Manufacturing* includes new material on CAD drafting, 3D CAD, surface modeling, solid modeling, feature-based modeling, variational and parametric modeling, tools for PLC logic design, and kinematics of NC machines. New chapters include “Geometric Tolerancing,” “Geometric Modeling,” “Statistical-Based Process Engineering,” “Fundamentals of Industrial Control,” and “Rapid Prototyping.” A valuable resource for any professional who needs to stay ahead of the latest issues and technology related to computer-aided design and manufacturing.

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- Sales Rank: #735449 in Books
- Published on: 2005-07-07
- Original language: English
- Number of items: 1
- Dimensions: 9.20" h x 1.30" w x 7.20" l, 2.48 pounds
- Binding: Paperback
- 684 pages

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Editorial Review

From the Publisher

An in-depth introduction to CIM and flexible or programmable manufacturing systems -- from product design to manufacturing control.

From the Back Cover

This book presents an in-depth introduction to CIM and flexible or programmable manufacturing systems, from product design to manufacturing control. Industrial Engineering Second Edition presents the scientific foundations for understanding the issues and technologies of modern CAM and related design and system planning activities. The book covers the major topics of CAM and CAD, from introductory to advanced while considering manufacturing hardware and software, manufacturing systems and devices, automation, flexible automation, and computers in manufacturing. It presents an integrated view of engineering so that readers may gain a complete view of product design and development. The second edition of Industrial Engineering has been revised to include expanded coverage of Computer Aided Design, Tooling and Fixturing, Programmable Logic Controllers, and Concurrent Engineering; while coverage of AI in Manufacturing and CAPP Systems has been deleted. A valuable resource for any professional who needs to stay ahead of the latest issues and technology related to computer-aided design and manufacturing.

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The paradigm of engineering is undergoing a major evolution throughout the world. The use of computers and the Internet has changed the way that we engineer and manufacture products. Among the recent trends in manufacturing are trends in which products are subject to a shorter product life, frequent design changes, small lot sizes, and small in-process inventory restrictions ("lean manufacturing"). The result of these trends is that today more than 90% of our products are manufactured in lots of less than 50 parts. These low lot quantities have eliminated many applications of dedicated production lines that were so effective in producing the inexpensive goods of the 1950 and 1960s.

The first step the nation employed to remain competitive with our international counterparts was the application of computer-aided design (CAD) and computer-aided manufacturing (CAM) to design and manufacture sophisticated products. Today, we routinely employ CAD to design products and flexible or programmable manufacturing systems to produce low- to medium-volume batch quantities. The Internet provides us with the connection to share design, marketing, and manufacturing information. We now look toward the advent of *distributed design and manufacturing using agile networking* as a means to produce products for the twenty-first century.

Employing numerical control (NC) and robotics in industry offers one potential solution to many manufacturing flexibility problems. This implementation, however, brings with it a variety of other problems. Robots and NC machines are designed to be flexible, self-contained, and capable of operating in both "stand-alone" and "integrated" manufacturing environs. Integrating this hardware into manageable systems has become a major focus of machine-tool makers and industry. Individual NC machines have also been made more versatile, more precise, more rigid and durable, and faster. More complex parts can be machined with higher accuracy and in less time. Timecompressed manufacturing technologies such as NC and rapid prototyping are being used more routinely to shorten product development cycles and to produce one-of-a-kind products. The benefit of all these new technologies cannot be achieved without the

"communication networks" or an understanding of how these activities fit together. Today, it is not unusual for a design made thousands of miles away to be transferred to and realized in a remote site. Part programs and control instructions are downloaded from offices to machine controllers. Shop-floor operations can also be monitored either on-site or from afar. Manufacturing equipment has become part of the supply chain; capacity and availability are parameters used in planning and control of the entire chain. Further integration of the manufacturing component with design and business systems is also a key to our manufacturing success. These communication and control issues, coupled with a variety of sensing issues, are critical to the success of flexible automation in the United States.

This book focuses on the science, mathematics, and engineering of these new engineering methods. It is dedicated to making sure that the United States will remain the most efficient manufacturing nation in the world. The purpose of the book is to provide a comprehensive view of manufacturing, with a focus on design, automation, flexible automation, and the use of computers in manufacturing (CIM). Unlike other CIM books, this one attempts to provide a strong analytical science base and background in computer-aided manufacturing systems. The book is an excellent professional reference and also is an excellent text for CAM instruction.

We would like to thank the reviewers who provided feedback on the several drafts of this edition: Jeanette M. Garr, Youngstown State University; Nicholas G. Odrey, Lehigh University; Gary E. Rafe, The University of Toledo; Robert P Van Til, Oakland University; and Gongyao (Jack) Zhou, Drexel University. We have also written an instructor solutions manual for this text. Copies are available either from your local Prentice Hall rep or by sending an email to engineering@prenhall.com

The book is written for advanced undergraduate and graduate courses. Each chapter covers general background, fundamental principles, and applications. Unlike most other manufacturing books on the market, it includes both descriptive information and analytical models. Whenever possible, MATLAB is used in examples. We do not assume that readers have a significant background beyond basic undergraduate engineering courses. However, the book does cover a very wide range of technologies and methodologies. Readers will gain in-depth and practical knowledge in CAM technologies.

Users Review

From reader reviews:

Kimberly Pratt:

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The book Computer-Aided Manufacturing (3rd Edition) has a lot of information on it. So when you make sure to read this book you can get a lot of profit. The book was written by the very famous author. This articles author makes some research just before write this book. This book very easy to read you can obtain the point easily after perusing this book.

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