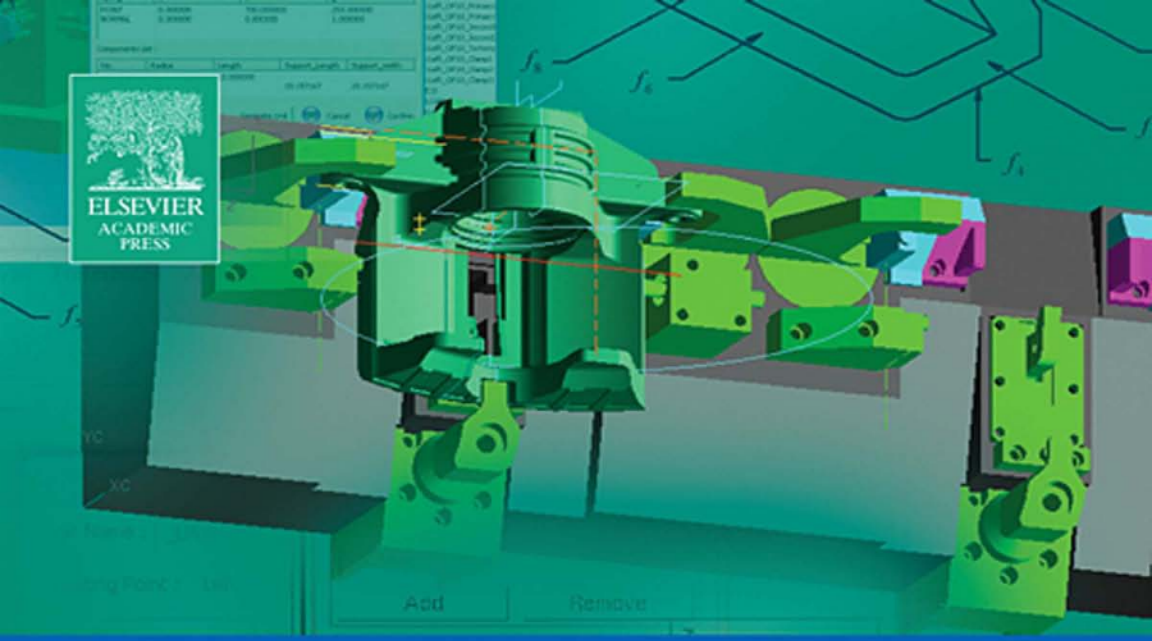

Yiming Rong / Samuel Huang
Zhikun Hou

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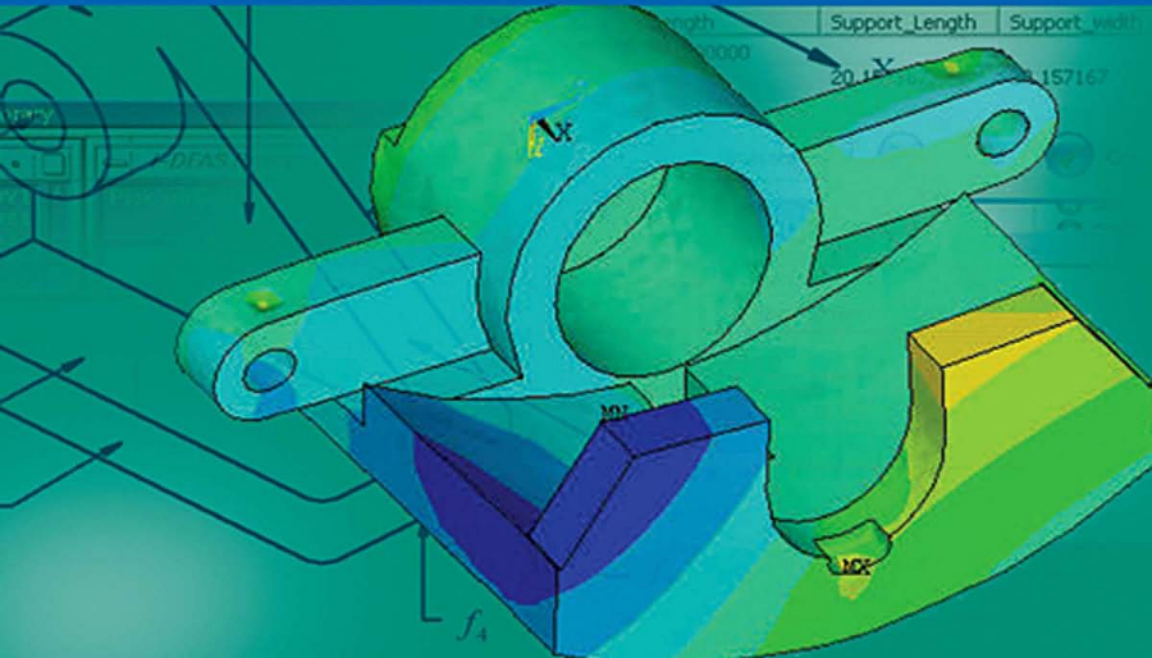

Advanced Computer-aided Fixture Design

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PREFACE

Manufacturing industry involves tooling intensive operations. Fixturing is an important manufacturing operation which contribute greatly to the production quality, cycle time, and cost. As computer technology, especially computer-aided design and manufacturing (CAD/CAM), developed, more and more attention has turned to design and verify fixtures digitally. For more than 15 years, computer-aided fixture design (CAFD) techniques have been developed and gradually applied in industry. The motivation of CAFD is to generate conceptual and detail fixture designs rapidly even in product and production design stages, to provide tools for fixture design and process verification, and to implement the CAD/CAM integration.

A first book introducing the CAFD technique comprehensively was published in 1999. *Computer-aided Fixture Design* (published by Marcel Dekker, New York, 1999, ISBN: 0-8247-9961-5) summarized the author research work of CAFD from 1992 -1999. Since the book published, a lot of advanced research on CAFD has been carried out. Especially the CAFD has been expanded to and integrated with machining systems planning and fixture design analysis for process verification. The aim of this book is to provide a comprehensive knowledge of CAFD and to introduce the recent research advance on CAFD as well as in relevant fields. This book is mainly based on the authors' long time research work on CAFD. The content of the book is uniquely designed for a thorough understanding of the CAFD and related topics, from fixture planning to tolerance analysis both inter-setups and intra-setup, and from fixture structural design to fixture design verification. In the new era of supplier-based manufacturing, CAFD techniques and systems are particular important in technical specifications and business quoting as well as process verifications between OEM and their suppliers.

This book can be used as a text book for engineering graduate students in class study or an engineering reference book for manufacturing engineers in workshop practice.

The CAFD problem has been increasely studied. Development of a practical techniques and applications system in CAFD is a major task in the study. This will be the second comprehensive-technical reference book in the area. The related research has been supported by National Science Foundation (NSF) and major manufacturing companies, such as Delphi Corporation, Caterpillar, Ford Motor Company, Pratt & Whitney, and GE Aircraft Engines.

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Yiming (Kevin) Rong is the Higgins Professor of Mechanical Engineering and the Director of Computer-aided Manufacturing Laboratory (CAM Lab.) at Worcester Polytechnic Institute (WPI). He received a B.S. Degree in Mechanical Engineering from Harbin University of Science and Technology, China, in 1981; an M.S. Degree in Manufacturing Engineering from Tsinghua University, Beijing, China, in 1984; an M.S. Degree in Industrial Engineering from University of Wisconsin, Madison, WI in 1987; and a Ph.D. in Mechanical Engineering from University of Kentucky, Lexington, KY, in 1989. Dr. Rong worked as a faculty member at Southern Illinois University at Carbondale for eight years before joining WPI in 1998.

Dr. Rong's research area is Computer-aided Manufacturing, including Manufacturing Systems, Manufacturing Processes, and Computer-aided Fixture Design (CAFD). His research on CAFD has been recognized both nationally and internationally. He is the principal investigator of many research projects funded by NSF, DOE, the Air Force, SME, and several major manufacturing companies. Dr. Rong is a fellow of ASME and a member of SME and ASEE. He has published many technical papers in professional journals and conference proceedings.

Samuel H. Huang is currently Associate Professor and Director of Intelligent CAM Systems Laboratory at the Department of Mechanical, Industrial and Nuclear Engineering (MINE), University of Cincinnati. He has over ten years of machining-related research experience and published over 80 technical papers. He also worked for UGS/PLM Solutions in 1996 and 1997 and managed several projects on CAM functionality improvement for the Unigraphics software package. In the summer of 1993, he worked as a guest researcher at NIST's Manufacturing Systems Integration Division. Dr. Huang received a B.S. Degree in Instrument Engineering from Zhejiang University (P. R. China) in 1991, and M.S. and Ph.D Degrees in Industrial Engineering from Texas Tech University in 1992 and 1995, respectively. He is a member of SME, IEEE, IIE, ASEE, and Alpha Pi Mu.

Zhikun Hou is currently Professor of Mechanical Department at Worcester Polytechnic Institute. He received his Masters of Engineering Degree from Tongji University, China, in 1981; and Masters of Science and Ph.D. degrees from California Institute of Technology in 1985 and 1990, respectively. He has served on the ASCE Dynamic Committee and ASME Committee of Uncertainty and Probability and is an Associate Editor of *The Journal of Shock and Vibration*. He has authored over 100 technical papers in the area of dynamics and vibration, including random vibration and reliability analysis, earthquake engineering and structural dynamics, smart materials and intelligent structure, and, most recently, structural health monitoring.

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