An Advanced Treatise on Fixture Design and Planning

SERIES ON MANUFACTURING SYSTEMS AND TECHNOLOGY

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AN ADVANCED TREATISE ON FIXTURE DESIGN AND PLANNING

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A.Y.C. Nee	To my wife Siew Kheng and daughters
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understanding
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A. Senthil kumar	To my parents Prof Anantharajan and
Ms Vijayalakshmi, and my wife Amutha and
son Saravan for their help and understanding

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Preface

The primary goal of this book is to cover, as much as possible, the state-of-the-art development in the domain of computer-aided fixture design and planning. The text concentrates on key issues central to the development of computer-integrated manufacturing, such as fixture design automation, fixture clamping layout synthesis, clamping intensity optimisation, workpiece-fixture interaction, intelligent fixtures which are integrated with processing equipment or machine tools, Internet-enabled fixture design and modular fixture database management.

This book is intended to be a reference text for academics, manufacturing and industrial engineers. It may also be used as a text for engineering graduate students in the discipline.

The organisation of the book is arranged in a topical manner. It begins with a concise presentation of the generic principles of fixture design in Chapter 1. Chapter 2 discusses the concept of integrated computer-aided fixture design system. It presents a 3D CAD-based system which is able to produce automated, interference-free fixture design and assembly solutions. Chapters 3 and 4 cover the framework and methodology to determine a viable clamping layout in terms of optimal clamping points, positive clamping actuation sequence, and minimal sustainable clamping intensities.

The dynamic interaction between a workpiece and its fixture plays a crucial role in fashioning the finished accuracy of a part. Experimental investigation presented in Chapter 5 provides an insight into the workpiece stability and the inherent dynamic nature of the workpiece-fixture system. The book then details the architecture of an intelligent fixturing system in Chapter 6, which is capable of tool path compensation and on-the-fly moderation of fixturing parameters so as to minimize workpiece displacement and distortion.

Chapter 7 presents a fixture element database management system which is essential to the automation of fixture design process. It is followed by a description of an Internet-based interactive fixture design system in Chapter 8. This system promotes the concept of collaborative design in a distributed manufacturing environment.

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Last but not least, we would like to dedicate the book to three distinguished academicians who have contributed indirectly to this book, they are the late

Dr Ken Whybrew
Professor Amitabha Bhattacharyya
Professor Inyong Ham

Dr Ken Whybrew was the co-author of a first book “Advanced Fixture Design for FMS” written together with AYCŃ and ASK. Prof Bhattacharyya provided an unpublished manuscript written with Prof Ham to AYCŃ many years ago and some materials of this manuscript are presented in Chapter 1.

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