

## Preface

With the increasing globalisation trend and keener competition in the market, modern product development companies are experiencing much higher pressure on minimising both the design cost and the lead-time. With the rapid advances in computing and Internet technologies, an Integrated and Collaborative Environment (ICE), which is based on the complementary functions of concurrent engineering and Internet-based collaborative engineering, is imperative for an establishment to facilitate the product realisation processes. Enabling technologies such as the feature technology for Computer-Aided Design (CAD), the optimisation technology for Computer-Aided Process Planning (CAPP) and collaborative design technology are being actively investigated.

Feature and CAPP technologies have been studied extensively and major monographs in these areas were published in the early and mid 1990s. Most of the operations in commercial 3D CAD systems are feature-oriented. For the more challenging issues, such as integration and conversion of features for different applications, research works only appear in the last ten years, and the relevant system applications are far from satisfaction. In Internet-based collaborative design, the relevant research and development are evolving dramatically and the trend is driven by the rapidly emerging intelligent and information technologies. However, developed methodologies and systems are still in their infancy.

From early 1999, the authors initiated several projects to investigate the relevant topics, and some research results are presented in this book. The authors summarise the state-of-the-art technologies and present some development paradigms, aiming to provide an overall picture and

several examples to the readers. The major contents cover two aspects: (1) The most recent research and development of the aforementioned technologies in the last decade are surveyed, and (2) Details of the implementation strategies and case studies of some prototype systems are illustrated to help the readers understand the underlying algorithms and infrastructures of developing an ICE.

The organisation of the book is as follows. Chapter 1 is a general introduction of the main objectives and themes of this book. This book is organised into two major threads. Chapters 2 – 5 cover three major technologies for establishing an integrated product development environment, namely, the manufacturing feature recognition technology, feature conversion technology based on design-by-feature systems, and the CAPP optimisation technology. In Chapters 6 – 8, the product development environment is extended to support collaborative design activities with the incorporation of the state-of-the-art Internet technologies. Two major technologies are discussed, i.e., collaborative feature-based design technology and Web-based CAPP optimisation technology. For these technologies, the current research and development status are comprehensively surveyed in Chapters 2 and 6 respectively, and the detailed implementations are explained in Chapters 3, 4, 5, 7 and 8.

This book can be used as a text or reference for mechanical/manufacturing/computer engineering graduate students and as a reference for researchers in the field of concurrent engineering, collaborative engineering and intelligent manufacturing, as well as practising engineers in charge of the utilisation, deployment and development of concurrent and collaborative software tools to support product design and development, etc.

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