



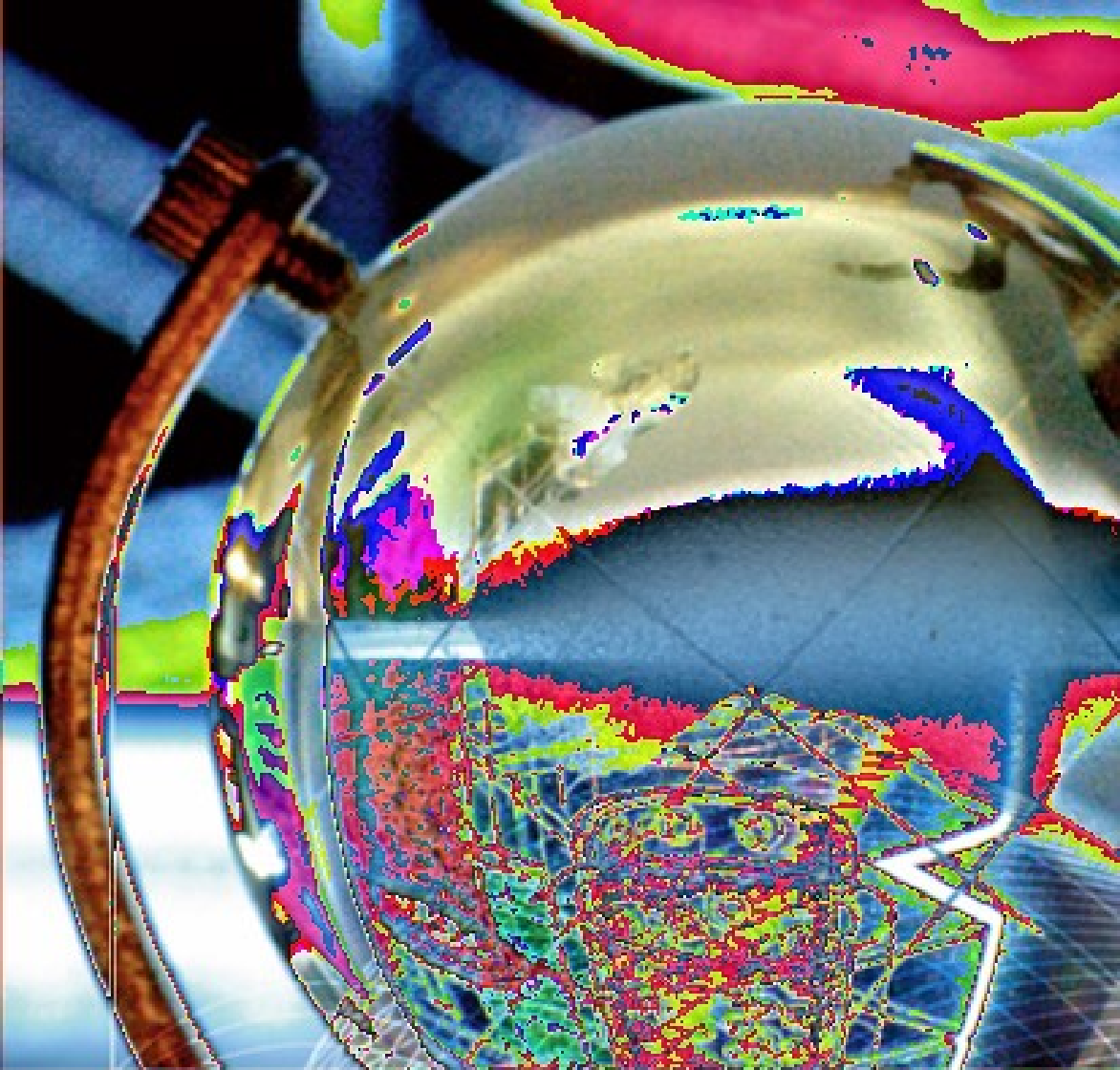
Xiu-Tian Yan
Chengyu Jiang

Benoit Eynard
Editors

Advanced Design and Manufacture to Gain a Competitive Edge

New Manufacturing Techniques and their
Role in Improving Enterprise Performance

 Springer



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Advanced

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Role in Improving Enterprise Performance

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Xiu-Tian Yan, BEng, PhD, CEng, MIET, FITL
Department of Design, Manufacture and
Engineering Management (DMEM)
University of Strathclyde
James Weir Building
75 Montrose Street
Glasgow G1 1XJ
UK

Benoit Eynard, PhD, MAFM, MDS
Department of Mechanical Systems
Engineering
University of Technology Compiègne
BP60319
60203 Compiègne Cedex
France

Chengyu Jiang, PhD
Northwestern Polytechnical University
127 Youyi Xilu
Xi'an 710072 Shaanxi
China

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Preface

Manufacturing industry has been one of the key drivers for recent rapid global economic development. Globalisation of manufacturing industries due to distributed design and labour advantage leads to a drive and thirst for technological advancements and expertise in the fields of advanced design and manufacturing. This development results in many economical benefits to and improvement of quality of life for many people all over the world. This rapid development also creates many opportunities and challenges for both industrialists and academics, as the design requirements and constraints have completely changed in this global design and manufacture environment. Consequently the way to design, manufacture and realise products have changed as well. More and more design and manufacture tasks can now be undertaken within computer environment using simulation and virtual reality technologies. These technological advancements hence support more advanced product development and manufacturing operations in such a global design and manufacturing environment. In this global context and scenario, both industry and the academia have an urgent need to equip themselves with the latest knowledge, technology and methods developed for engineering design and manufacture.

To address this shift in engineering design and manufacture, supported by the European Commission under the Asia Link Programme with a project title FASTAHEAD (A Framework Approach to Strengthening Asian Higher Education in Advanced Design and Manufacture), three key project partners, namely the University of Strathclyde of the United Kingdom, Northwestern Polytechnical University of China, and the Troyes University of Technology of France organised a third international conference. This conference aims to provide a forum for leading researchers, industrialists and other relevant stakeholders to exchange and debate their research results as well as research issue. This conference focuses on papers describing the cutting edge research topics, fundamental research issues related to the global advanced design and manufacture and recent industrial application papers with a goal towards bringing together design and manufacture practitioners from academics, government organisations, and industry from all over the world. The conference aims to cover the recent advancement and trends in the area of design and manufacturing and to facilitate knowledge sharing, presentations, interactions, discussions on emerging trends and new challenges in design and manufacturing fields. The particular focus of this conference is on the understanding of the impact of distributed team based design and manufacture on

research and industrial practices for global companies. Being the third conference in this theme since 2004, the aims of the conference are: (a) to become a regular major forum for the international scientific exchange on multi-disciplinary and inter-organisational aspects of advanced engineering design and manufacturing engineering; and (b) to provide opportunities in presenting and formalising the methods and means for industrial companies to design and manufacture successful products in a globally distributed team based environment.

It is well known that engineering design activities are mostly undertaken in the developed countries, represented by European, American and Japanese companies, whereas more manufacturing activities are undertaken by more companies that are located in Asia. This trend may start to change as some engineering design work is gradually outsourced in Asian companies as well. This increasing geographical distribution of tasks involved in the whole product realisation process brings great challenge as well as huge benefits for all stakeholders. It is therefore timely to organise this international conference and bring together leading researchers, academics and industrialists to discuss these issues and promote the future research in these important areas.

Out of 385 full papers submitted, the organisers use the review results from international reviewers, and finally selected 174 papers for publication. Based on the topics of the paper submitted, editors have divided them into relevant chapters and produced two books. This book focuses on the advancements in simulation and virtual reality in engineering design and manufacture, advancement in various manufacturing aspects, including manufacturing tool design, process planning, special manufacturing techniques, MEMS and industrial applications of design and manufacture techniques and practices. The book hence contains a selection of refereed papers presented at the conference. It represents the latest thinking on manufacture from mainly Europe and Asia perspectives. It includes 88 papers from 174 accepted refereed papers, focusing on the advancement in the area of manufacturing technologies, supporting tools and special techniques.

More specifically, the book covers the following eight broad topics in manufacturing and associated tools and each of these has been called a chapter:

Chapter 1: Simulation and Virtual Reality Enabled Design and Manufacture Analysis

Simulation and virtual reality have been developed over recent years to provide effective and rapid evolution of design solution for both products and manufacturing systems. This chapter collects sixteen papers relating to the use of these technologies and provide a collection of latest technological development and their applications mainly in manufacturing operations, such as assembly, robotics and so forth.

Chapter 2: Materials Design and Processing

Material design and processing remain to be a critical discipline for product realisation. Recent development in the field shows an increasing trend to integrate material design with manufacturing and product developments. This can bring the benefits of designing and manufacturing complex components using these

developments from early material design stage. This chapter collects seven papers on material and their property related research.

Chapter 3: Manufacturing System Design and Analysis

This chapter contains eighteen papers on various types of manufacturing machine design and development. Examples include designs of multi-axis machine tool, reconfigurable production line design, ball screw feed system and as extensive as wireless temperature measurement system design. Modelling, testing and evaluation techniques have been used by authors to validate their design solution in the process.

Chapter 4: Machine Tools and Manufacturing Technologies

Machine tools have been and will still be the key tools used in manufacturing industry and it is inevitable that there are a large group of researchers are working in the field to have better understanding of various aspects of the operations of machine tools and associated manufacturing techniques. Seventeen papers have been selected in this chapter to reflect the latest research understanding and findings in the field. Topics included in the chapter covers the tooling life analysis, machine parameter optimisation, joining process between steel and aluminium, and high speed machining and so forth.

Chapter 5: Manufacturing Planning

Manufacturing operation planning is still a key to the lean manufacture and responsive manufacturing operations. Well planned operations will reduce product manufacturing time and improve product quality. This chapter includes eleven papers on the process routing planning, service driven information processing for planning and simulation, robotic hand grasp planning, engineering of economy of scope system design and plan etc.

Chapter 6: MEMS

MEMS has been a popular research area in recent years and there have been significant development in the field, resulting in more environmentally friendly manufacturing technologies as these micro-machine tools consume significantly less energy and space to manufacture miniature sized components and products. Eight papers have been chosen to illustrate a range of topics including micro-hole drilling, punching, machining, micro-assembly maybe using desk-top micro-factory, and design issues related to laser based micro-manufacturing.

Chapter 7: Special Manufacturing Techniques and Industrial Applications

The final chapter of the book illustrates the latest development on some special manufacturing techniques, including Electrical Discharge Machining (EDM) techniques, combined continuous grinding and electrochemical processing techniques, air-bulging techniques used in in-mould decoration design and thermoforming. This chapter also has emphasis on the industrial applications of these new or improved special manufacture techniques. Several industrial applications have been shown in the chapter.

It is the editors' believe that by introducing these advanced design and manufacturing techniques developed recently in the manufacturing operations, that many enterprise will be able to gain competitive advantage.

The editors of the book:

Xiu-Tian Yan, Chengyu Jiang and Benoit Eynard

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