
Editorial

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Biographical notes: Chun-Hsien Chen is Associate Professor in the School of Mechanical and Aerospace Engineering at Nanyang Technological University, Singapore. He received his BS degree in Industrial Design from National Cheng Kung University, Taiwan and his MS and PhD degrees in Industrial Engineering from the University of Missouri-Columbia, USA. He has several years of product design and development experience in the industry. His research interests are in collaborative product development, knowledge management for design and manufacturing and artificial intelligence in product/engineering design. He is an editorial board member of the journal *Advanced Engineering Informatics*.

Ming-Chyuan Lin is currently Associate Professor in the Department of Industrial Design at National Cheng Kung University, Taiwan. He received his BSE in Industrial Design from National Cheng Kung University and MS and PhD in Industrial Engineering from the University of Missouri-Columbia, USA, respectively. His research interests are human factors engineering and computer-integrated design and manufacturing systems.

Kuohsiang Chen received both his PhD and MS degrees from the Institute of Design of the Illinois Institute of Technology. Currently, he is Associate Professor and Head of the Department of Industrial Design of the National Cheng Kung University (NCKU) in Taiwan. He is currently conducting a cross-university joint research project and is serving as deputy Director of the

Educational Resources Center and as co-chairperson of the International Reviewers Board for 2005 International Design Conference and as co-guest editor for a special issue of IJPD.

Product design and development is a complex process that requires various customer requirements or needs as well as constraints to be satisfied simultaneously. Frequently, it involves domain specialists of different disciplines such as business, management, design, manufacturing and marketing. The numerous trade-offs and decisions that need to be made among the specialists have become a characteristic of a typical contemporary product design and development process. Moreover, the product design and development tasks have changed drastically and fundamentally owing to recent advances made in business, management, marketing and technology.

In a knowledge-based economy arena on the one hand, more companies are setting up operations overseas, and more product design and development activities are conducted at geographically distributed locations. On the other hand, technology, consumer sophistication and business globalisation have led to a highly competitive business environment which demands faster new product introduction and more complex and value-added, customised products. Under the circumstances, new product development or product reengineering can no longer rely on criteria or strategies that focus on the product alone. As a result, more industries begin to realise the importance of the needs of customers. Only effective customer-driven strategies are able to assist a company to gain a prominent competitive edge over its competitors. With the shift in focus, leading companies have begun to reengineer traditional approaches to product design and development, and they have sought new internal and external metrics to satisfy customer needs.

This special issue collects articles offering various viewpoints of customer-oriented design and collaborative product development. In the first paper, 'CREAMS: a customer requirements elicitation and management system for product conceptualisation', Yan, Chen and Khoo propose a Customer Requirements Elicitation and Management System (CREAMS). The goal of this system is to effectively support product conceptualisation decisions by integrating various multidisciplinary requirements and concerns. The proposed system consists of two modules for eliciting and managing customer requirements in product conceptualisation. In the process of customer requirements elicitation, a web-based survey is adopted to obtain customer information. Subsequently, an intelligent agent, which consists of a pattern recognition engine and a query engine, is employed for further customer requirements evaluation and management. It is suggested by the authors that, with reliable voice of customers and more effective customer requirements management, better product concepts can be realised.

In the second paper, 'The process of user-innovation: a case study in a consumer goods setting', Tietz, Morrison, Lüthje and Herstatt analyse the way users improve or develop novel products. The paper addresses the process underlying user innovations. The authors found that users, when compared with manufacturers, take a distinct path when inventing a product (a novel product). By analysing the approaches adopted by a number of user inventors, the authors identified a sequence describing how these

consumers invent the product. Basically, this sequence consists of two stages, namely, idea generation and idea realisation. These two stages can be further divided into several steps. The proposed process model may help manufacturers to support innovation-related activities more efficiently. In addition, the knowledge about the sequence might help manufacturers to identify inventive users.

Based on the concept of mass customisation, in the third paper, 'Product family positioning based on customer value', Zhang and Jiao present a maximising customer value model to deal with the dilemmas encountered in the product family positioning problem. The two dilemmas encountered in providing product variants are variety dilemma and quality dilemma. The variety dilemma refers to the trade-off between the customer requirements and product variants, whereas the quality dilemma refers to the trade-off between the customer preference for high quality products and the resulting increased costs. In the proposed model, conjoint analysis is employed to quantify the customer preference of each individual product specification, and genetic algorithm is adopted to tackle the combinatorial optimisation problem.

In the next paper, 'An integrated prototyping and knowledge representation procedure for customer-oriented product design', Lin and Chen describe a design alternative generation procedure that integrates a design prototyping approach and a rule-based system to improve the efficiency of product design and development. This approach aids designers in identifying design parameters and values in the development process; the rule-based system assists designers to link user requirements with design characteristics. An external programme is established to identify variables and develop form representation for the design components. It is claimed by the authors that the proposed approach may enhance the efficiency of conventional product design expert systems and provide designers with a rapid way to generate design alternatives based on customer requirements.

From the viewpoint of satisfying consumers' psychological desire, in the paper 'Managing product identity through style recurrence', Chen and Shao propose a framework for managing corporate product identity through style recurrence. In so doing, firstly, the strategy of a corporate identity and its product identity was recognised. Then the generation rules for its product style were established and used as a practical norm for product design. Subsequently, the practical norm of design was examined against the strategy of corporate identity and product identity to test for its usefulness. The proposed framework has been illustrated and validated using a computer programme. The results were promising and revealed the potential of the proposed approach.

In recent years, mobile commerce (or m-commerce) offers a great opportunity for businesses to connect to consumers by providing value-added services such as mobile shopping, ticketing, news, games, music, videos, *etc.* To ride on this trend, in the sixth paper, 'Injecting usability in m-commerce', Chui, Lee, Helander, Chong and Lawan report the results of two usability studies of a telecommunication service provider's WAP (Wireless Application Protocol) portal and offers some usability guidelines for the design of WAP portals. The authors conclude that the most often used m-commerce services were downloading items, surfing the internet and accessing information. Short downloading time (shorter than ten seconds) was found as being most important. The Bookmark function was often invoked for rapid access but was not easily accessible.

In the last paper, 'A case study on non-parametric design method in ODM collaborative product development', Ma conducts a case study based on the non-parametric CAD modelling approach with a distributed collaborative design project. Based on the case study on the design of a typical mechatronic product, the author suggests that non-parametric modelling methodology enables collaboration in several ways and shows many advantages when facing new challenges. A comparative analysis between parametric and non-parametric modelling methodologies has also been carried out. The author concludes that non-parametric modelling outperforms parametric modelling in interoperability at the solid model level. This has created tremendous benefits in ODM (Original Design and Manufacturing) business model.

The Guest Editors would like to thank all the authors for submitting and revising papers for the special issue. We also wish to extend our thanks to the referees in providing their valuable comments to the papers, which are most essential for controlling the quality of this special issue. Lastly, the Guest Editors would like to express their sincere appreciations to Dr. Mohammed Dorgham, the Editor-in-Chief, and Ms. Liz Harris, the Journal Manager, for their advice, help and support to make the special issue come true.