
Editorial

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Biographical notes: Lionel Roucoules is appointed as Full Professor at Arts et Métiers ParisTech Institute (France) since 2008. Previously, he was Associate Professor of Design and Manufacturing in the Department of Mechanical Engineering at the Université de Technologie de Troyes – UTT (France). He received his PhD from the National Polytechnic Institute of Grenoble dealing with collaborative product modelling in 1999. The context of his research is integrated design and collaborative IT platform in a global PLM vision. His specific interests are product-process interface and he proposed a DFM-synthesis approach, which is now part of a larger DFX modelling for virtual prototyping by least commitment supported by MDE platform.

Xiu-Tian Yan, PhD, BEng, CEng, FIMechE, MIET (MIEE), FHEA, is a Reader, Postgraduate Courses Director at Strathclyde University, UK. He received his PhD from Loughborough University of Technology in 1992. His research interests include computer support mechatronic systems design using AI techniques, knowledge-intensive product modelling and simulation, and life cycle oriented design synthesis. He has published over 150 papers in the international journals and conferences in these fields. He is Vice Chairman of the Mechatronics Forum. He is a Fellow of the Institution of Mechanical Engineers, Chartered Engineer and member of Institution of Engineering and Technology.

Benoît Eynard, currently, is a Professor of the Department of Mechanical Systems Engineering of the Université de Technologie de Compiègne – UTC (France). Previously, he was an Associate Professor of Mechanical Engineering and Information Technology in the Department of Mechanical Engineering at the Université de Technologie de Troyes – UTT (France). He received a PhD from the University of Bordeaux in 1999. Currently, his research interests include collaborative design, product data exchange, product lifecycle management, virtual prototyping and digital manufacturing. He has published over 100 papers in the international journals and conferences in the above-mentioned fields.

Design for X has been established as a key design method in modern product lifecycle engineering to reduce the product development lead time, manufacturing cost and more broadly to improve the sustainability of product manufacture. Various specific techniques have been developed and used successfully in mechanical and electronic products design. In recent years, the design constraints imposed on designers have been extended from the traditional manufacturing consideration to even wider ones, including factors such as environment, legal requirements and sustainability. This has created an even bigger challenge for engineering designers to tackle the so-called lifecycle issues at the early design stages. The research question of how to consider, use and foresee all these lifecycle implications and consequences resulting from design decisions made at the early design stage becomes an important research challenge. With these advancements in design for X and ever-increasing pressure on companies to produce better products in a shorter period of time, it is imperative to survey, identify and introduce these developments to product design practitioners and academic researchers and educators.

The aim of this special issue of *International Journal of Product Development* is, therefore, to present the latest research results in this focused area, and promote an awareness of the research issues, results and tools developed to support better lifecycle engineering considerations. The special issue will present a balanced view of the challenging problem definitions, new framework and methodologies proposed to tackle them, IT-based solutions, effective approaches applied in different industrial sectors, evaluations of the approaches and identifications of future research directions.

First group of papers considers the challenges found in innovative and collaborative design and reports the outcomes of research applications supporting computer-aided design and broader computer-aided engineering. McKay et al. propose shape grammars enabling automated detection and subsequent generation of shapes based on designer's sketches. In the paper by Farrugia et al., a proposal of sketch-based parametric CAD modelling for collaborative or off-site design and real-time exchange of drawings between distributed project teams is developed. Wang et al. focus on the development of a collaborative simulation environment to support the design and analysis of mechanical products.

Second group of papers addresses the decision making, management of design decisions and rationales for these decisions and the deployment of design guidelines in product lifecycle engineering and design for X. Rehman and Yan develop a computational framework for knowledge management and decision making for conceptual design, using the so-called design context knowledge to enable the

considerations of lifecycle engineering issues. In Holt and Barnes, a decision-analysis-based approach is proposed for design for manufacture aimed at the early conceptual design stage, and can also be used for comparing and developing design guidelines. Brunel et al. consider product knowledge assessment to clarify and manage the designers' decision making in the whole product lifecycle engineering.

Guest editors wish that readers will find in this special issue a significant survey and original contributions in the field of information technology enabling design for X and product lifecycle engineering. The authors have undertaken huge work in developing deep research contents for their papers. We hope those papers will be of great interest to readers and intensively stimulating the scientific investigation and discussions among the academics and practitioners working on engineering design and IT-based research and applications.

Last, we would like to thank all authors and reviewers who have contributed to the quality and success of the special issue. Special thanks go to the editor team of *International Journal of Product Development* who share our view on the need and interest in the topics we proposed for a special issue and provide the necessary support for publishing these highly relevant and timely papers.