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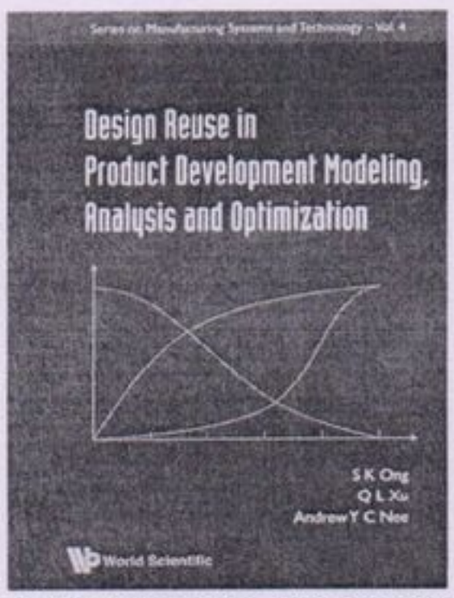
Book review

Drowned in data but thirsty for knowledge

S.K. Ong, Q.L. Xu, Andrew Y.C. Nee. Design Reuse in Product Development Modelling, Analysis and Optimization, World Scientific, Singapore (2008). 298 pp., £55.00, ISBN: 978-981-283-262-7



How can design reuse be utilised as an effective knowledge management methodology, so that good, existing ideas can be put to effective use, especially during early stages of product development? Taking this as a major motivation for writing this book, the authors focus on three broad areas: modelling, analysis and optimisation of designs. In modelling, their intent is to help capture and organise information in a form suitable for reuse; in analysis, to explore domains, identify useful knowledge, and assemble these in reusable forms; and in optimisation, to support the design by reuse process.

The book has nine chapters. Chapter 1 discusses motivation for design reuse, and provides an overview of various reuse methodologies; Chapter 2 reviews various design reuse systems and enabling tools, Chapter 3 discusses various information modelling techniques for reuse, Chapter 4 focuses on design of product platforms; Chapter 5 is on optimisation of product designs, Chapter 6 describes various modelling techniques for cost estimation in product development; Chapter 7 focuses on evaluation of product platforms; Chapter 8 proposes a methodology for product family design reuse; and Chapter 9 discusses approaches to design reuse in embodiment and detailed design stages. The target readership for the book is undergraduate and postgraduate students alike, and researchers in mechanical and computer science interested in understanding the principles of product development. It is also intended to be a reference book for practicing engineers and managers. The book has a nice size and volume that can be easily held and read. On the whole, the style of writing, tables and illustrations are clear and, except for a few typos, free from errors.

The book starts off quite well, nicely building up the need for design reuse methodologies and tools. The authors view reuse to be possible at three levels: reuse of products at the end of their life, reuse of resources during their manufacturing, and reuse of product information and design knowledge during the development of the products; the third is stated as the focus of this book. As the authors quote from Rezayat, today's designers are in a dilemma of being "drowned in data but thirsty for knowledge", requiring more effective management of information for design reuse. Chapter 2 therefore focuses on various reuse approaches such as case based reasoning, catalogue based design, modular design, adaptive design, etc., and on various reuse reasoning approaches such as data mining and machine learning. The subsequent chapter on product information modelling is also nicely linked to this major focus, and is useful as a pointer to various modelling approaches, languages, taxonomies and database systems. From then on the chapters focus heavily on product platforms and automation. One begins to lose the thread with design reuse as Chapter 5 focuses delves into design optimisation, and Chapter 6 into cost estimation, before the chapters become increasingly oriented towards the work of the authors, particularly regarding building product platform development methodologies.

As a result, while starting with the focus on the broad topic of design reuse, the book seems to end up instead as one on Modern Methods in Product Development, with perhaps an overemphasis on automation and product platform methodologies.

The references are reasonably up to date although, for a book published in 2008, there are not many references after 2003. One major limitation of the book is its lack of discussions on (1) descriptive literature on design reuse practice, (2) design rationale capture and reuse methodologies such as IBIS, (3) rationale capture and reuse tools such as DRed, and (4) perspectives on the best practice — what industry currently finds useful in terms of design reuse. Perhaps an extended discussion on and pointers to recent advancements in design ontology would also have been helpful.

Overall, the strongest point of this book is that it brings together a large cross section of methods, techniques and tools for modelling, analysis and optimisation in product development, and would therefore be a useful reference to these methods, techniques and tools. However, in the process of being inclusive, it seems to have lost its way from its main focus: design reuse. By borrowing from where the authors started, perhaps it may leave the reader drowned in data and yet thirsty for knowledge.

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