
Book Review

Reviewed by Xun W. Xu

Email: xun.xu@auckland.ac.nz

Concurrent Engineering in the 21st Century – Foundations, Developments and Challenges
by: Josip Stjepandić, Nel Wognum and Wim J.C. Verhagen (Eds.)
Published 2015
by Springer International Publishing
AG. Gewerbestrasse 11, 6330 Cham, Switzerland, 839pp
ISBN: 978-3-319-13776-6

Concurrent engineering, also called simultaneous engineering, was used the first time in the USA in 1989. It is a concept in which different phases of product development run concurrently instead of sequentially in order to increase the competitiveness by decreasing the lead-time but still improving quality and cost (Sohlenius, 1992). In fact, some of the basic concept of concurrent engineering can be traced back as early as the end of the 19th century (Smith, 1997). Over the years, concurrent engineering practices have been supported by many advanced computer-aided technologies and tools. Though concurrent engineering started from the design and manufacturing phases (Bronsvort and Jansen, 1993), it was soon extended to encompass all product lifecycle activities such as marketing, logistics, sales, customer support, and even disposal and recycling. To this end, concurrent engineering is rather a long-term and overarching business strategy, with promised long-term benefits to business once properly implemented.

Concurrent engineering has been a subject of intensive research and development activities over the past two decades. An active community is the 'International Society for Productivity Enhancement (ISPE), Inc.' (ISPE, 2015). In 1994, ISPE introduced the annual international conferences on Concurrent Engineering. In fact, this book was initially conceived during the preparation stage of the 19th ISPE International Conference on Concurrent Engineering in Trier in September 2012. The contributors, altogether 59 of them, are primarily recruited from the ISPE community. They have justifiably fulfilled the goals of this book, i.e., describing the 'state-of-the-art' concurrent engineering achievements; presenting a selection of methods and tools in practice; demonstrating that concurrent engineering has become indispensable for businesses; and showcasing some of the compelling concurrent engineering practices.

The book has 28 chapters, which are organised into four parts: foundations, new developments and methods, applications and current challenges. One of the most difficult tasks in implementing concurrent engineering is the acquisition of the 'art' of effectively managing socio-technical relationships (Chen and Lin, 2003, 2004; Dadriyansyah et al., 2014). The readers interested in this aspect of concurrent engineering can find, in the first part of this book, some very useful insight into effectively dealing with dynamic interaction of technical and social characteristics.

Concurrent engineering must be based on relevant theories, efficient tools and be led by dedicated management (Sohlenius, 1992; Swink, 1998). Pokojski and Fukuda (2012), and Shahrokhi et al. (2011) have presented some of the more established tools and methods for concurrent engineering. The second part of this book is a further update on the latest developments and methods for concurrent engineering. These methods include the technology-oriented approaches (amongst others, knowledge-based engineering, product lifecycle visualisation, reverse engineering, and digital mock-up) as well as organisation-oriented approaches, e.g., collaborative engineering and systems engineering.

The concurrent engineering approach radically changes the ways that new products are developed. However, implementing concurrent engineering has not always proved easy. In realising such a challenge, Swink (1998) published a tutorial on implementing concurrent engineering. The matter of the fact is that the most useful tutorials of all are those successful implementation cases and/or user cases. For this reason, the third part of this book is dedicated to some of the most well-known applications of concurrent engineering in the industry, i.e., aviation, automotive, machinery, shipbuilding, consumer good industry, medical equipment industry and environmental engineering.

In the fourth part, the three editors of the book presented some current challenges in concurrent engineering. They used a socio-technical framework to classify and analyse the challenges identified as part of the foundations, methods and applications discussed in this book.

This book is a one-stop shop and a must-read for those who wish to understand the advanced development works and assessment of some novel approaches and techniques of concurrent engineering. The audiences may include, but not limited to, industry experts, managers, students, researchers, and software developers. The editors of this book are internationally well-known experts in the field of concurrent engineering. I am grateful that they teamed together to have compiled this excellent book, which will surely bring benefits to a broad group of readers as well as lay down an important milestone for the research achievements in the domain of concurrent engineering.

References

- Bronsvort, W.F. and Jansen, F.W. (1993) 'Feature modelling and conversion-key concepts to concurrent engineering', *Computers in Industry*, Vol. 21, No. 1, pp.61–86.
- Chen, S-J. and Lin, L. (2003) 'Decomposition of interdependent task group for concurrent engineering', *Computers and Industrial Engineering*, Vol. 44, No. 3, pp.435–459.
- Chen, S-J.G. and Lin, L. (2004) 'Modeling team member characteristics for the formation of a multifunctional team in concurrent engineering', *IEEE Transactions on Engineering Management*, Vol. 51, No. 2, pp.111–124.
- Dadriyansyah, G., Ibrahim, A. and Hassan, M. (2014) 'Antecedents and drivers for virtually collocated team: an insight from concurrent engineering perspective', *International Journal of Applied Engineering Research*, Vol. 9, No. 22, pp.17971–17982.
- International Society for Productivity Enhancement (ISPE) (2015) [online] <http://www.ispe-org.net> (accessed 1 May 2015).
- Pokojski, J. and Fukuda, S. (2012) 'Models, methods and tools in modern concurrent engineering', *Advanced Engineering Informatics*, Vol. 26, No. 4, p.762.

- Shahrokhi, M., Bernard, A. and Shidpour, H. (2011) 'A hybrid method to select best process and suppliers, in the concurrent engineering environment', *IFAC Proceedings Volumes (IFAC-Papers Online)*, Part 1, Vol. 18, pp.6402–6406.
- Smith, R.P. (1997) 'The historical roots of concurrent engineering fundamentals', *IEEE Transactions on Engineering Management*, Vol. 44, No. 1, pp.67–78.
- Sohlenius, G. (1992) 'Concurrent engineering', *CIRP Annals – Manufacturing Technology*, Vol. 41, No. 2, pp.645–655.
- Swink, M.L. (1998) 'A tutorial on implementing concurrent engineering in new product development programs', *Journal of Operations Management*, Vol. 16, No. 1, pp.103–116.