# Product and asset life cycle management in engineer-to-order industries (Editorial)


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**Biographical notes:** Christian Hicks is a Professor of Operations Management at Newcastle University Business School. His current research interests are: design and manufacturing management, lean supply and supply chain management. His recent articles have focused on engineer-to-order capital goods companies. He is a Chartered Engineer and is a Member of the Institution of Engineering and Technology.

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Engineer-To-Order (ETO) companies are involved in the design, manufacture and construction of capital equipment. Typical products include steam turbines, oil rigs, ships and trains. Individual products are often highly customised to meet customer requirements and are produced in low volume.

The notion that ETO products require a life cycle orientation in terms of product design and investment decisions has become widespread. The design phase now needs to take into account all the phases of the product life cycle from manufacturing to construction through to operations and finally decommissioning. This life cycle orientation makes the feedback of knowledge from the different stages of the life cycle into the design phase very important. However, the supply of capital goods is a globally competitive business. The life cycle orientation in design does not allow a longer lead-time or time-to-market. On the contrary, there is considerable pressure to reduce the duration of all processes including design. This places high demands on the organisation that has encouraged concurrent engineering and procurement and the increased use of computer aided engineering and computer aided production management systems.

This Special Issue aims to stimulate research that will improve the performance of engineer-to-order companies. A wide range of issues relating to different sectors of the capital goods industry are covered.

Hicks and McGovern analyse the characteristics of engineer-to-order companies, their markets, products, internal processes and supply chains. They briefly review the ETO literature. Design is a core capability of ETO companies. Design can involve incremental or radical innovation. Project, risk and supply chain management are important competencies. They consider that design change control, stage-gate systems and Capability Maturity Models show particular promise for helping ETO companies manage the product life cycle.

Ivory and Alderman consider the implications of the growing trend for Engineer-To-Order (ETO) companies to engage in projects that involve not just the design and manufacture of capital plant and equipment, but also responsibility for downstream aspects of the project such as operations, maintenance and service delivery. These types of long-term, service-focused projects introduce an added dimension of complexity to the project that stems from a proliferation of stakeholders and multiple 'customers' within the project. Drawing on three detailed case studies of projects with a long-term, service focus, this paper explores the problems facing ETO companies and their project managers in terms of identifying who the customer really is at any particular stage of the project and highlights some implications for the management of the design and innovation process in such ETO projects.

Alblas and Wortmann discuss a multiple case study of product platforms. Like many other artefacts, platforms have a life cycle. The authors discuss various industries, such as industrial machinery, aerospace, automotive and product software. This paper describes the requirements for platform life cycle management and concludes that there are strong arguments to distinguish platform life cycle management from the more common product life cycle management, and that best practices in various industries deserve to be generalised.

Liang considers the organisation of design processes in the construction industry. He presents the Grouping Decomposition (GD) model that is used to create design teams for a large civil engineering project. The *K*-means clustering algorithm is used to quantify the relative coupling strength of design/build tasks.

Most of the well-known management and improvement systems and techniques, such as Lean Production and Six Sigma were developed in high volume industries. Veldman and Klingenberg evaluate the possible use of the Capability Maturity Model Integrated (CMMI) as a method for improving processes in ETO companies. CMMI is the best practice reference framework that is widely used in the software industry. It includes some practices that are widely in ETO companies, but they identify that the original model needs to be enhanced.

Hicks and Pongcharoen consider the use of dispatching rules for selecting which jobs should be processed next from a queue of parts awaiting service. Research on dispatching rules has mainly focused upon deterministic job shop situations or small assembly environments and ignored operational factors. The paper investigates the effect of applying different manufacturing control approaches for resources with high and low utilisation. The work uses data obtained from an ETO capital goods company that produces complex products in low volume. A range of scenarios were considered in which an increasing proportion of resources were considered to be 'bottlenecks'.

The results show that the mean tardiness of products decreases significantly when the most highly utilised machines are carefully controlled.

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