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Analysis of design tool attributes with regards to sustainability benefits

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Abstract

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The trend of global manufacturing competitiveness has shown a significant shift from profit and customer driven business to a more harmonious sustainability paradigm. This new direction, which emphasises the interests of three pillars of sustainability, i.e., social, economic and environment dimensions, has changed the ways products are designed. As a result, the roles of design tools in the product development stage of manufacturing in adapting to the new strategy are vital and increasingly challenging. The aim of this paper is to review the literature on the attributes of design tools with regards to the sustainability perspective. Four well-established design tools are selected, namely Quality Function Deployment (QFD), Failure Mode and Element Analysis (FMEA), Design for Six Sigma (DFSS) and Design for Environment (DfE). By analysing previous studies, the main attributes of each design tool and its benefits with respect to each sustainability dimension throughout four stages of product lifecycle are discussed. From this study, it is learnt that each of the design tools contributes to the three pillars of sustainability either directly or indirectly, but they are unbalanced and not holistic. Therefore, the prospective of improving and optimising the design tools is projected, and the possibility of collaboration between the different tools is discussed. © Published under licence by IOP Publishing Ltd.

Indexed keywords

Engineering controlled terms: Competition, Life cycle, Manufacture, Process engineering, Product design, Quality control, Quality function deployment

Compendex keywords: Customer-driven, Design for Six Sigma, Element analysis, Global manufacturing, Product development stages, Product-life-cycle, Quality function deployments (QFD), Sustainability dimensions

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