Implementation of Life Cycle Assessment (LCA) in Development of Products

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Today's industry is being forced to consider the environmental performance of its products concurrently with traditional requirements such as quality, price or functional performance. The Life Cycle Assessment (LCA) technique has been identified as a powerful tool to calculate environmental impacts derived from products and system, and calculate resource consumptions. However, the complexity of LCA poses restrictions to its use in current product and system development given the need for a reduction in product development cycle time which is needed to meet the increasing competitive pressures and the rapid changes in markets for many products.

The overall aim of the paper is to provide an understanding of the environmental issues involved in the early stages of product development and the capacity of life cycle assessment techniques to address these issues. The paper aims to outline the problems for the designer in evaluating the environmental benignity of the product from the outset and to provide the designer with a framework for decision support based on the performance evaluation at different stages of the design process. The overall aim of this paper is to produce an in-depth understanding of the barriers to implementation of LCA by developers of products, and of the opportunities for introducing environmental criteria in the design process through meeting the information requirements of the designer on the different life cycle stages, producing an in-depth understanding of the attitudes of practitioners among product developers to the subject area, and an understanding of possible future directions for product development.

An Environmentally Conscious Design method is introduced and trade-offs are presented between design degrees of freedom and environmental solutions. It also discusses a number of possibilities which can be introduced in the design stage compared to the other life cycle stages of the product system.

The paper collects experiences and ideas around the state-of-the-art in eco-design, from literature and personal experience and further provides eco-design life cycle assessment strategies.

The paper reviews the current environmental evaluation practices with respect to product life cycles. As a number of deficiencies in LCA are identified, strategies are presented to provide a solution to many of the deficiencies. The result of the paper is a definition of the requirements for performance measurement techniques and a performance measurement environment necessary to support life cycle evaluation throughout the evaluation of early stages of a product system.