

Development of Method for Optimizing Product End of Life Strategies in Modular Design

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Product modularity is a concept and process of clustering the independent components into logical units that are relatively independent to each other in functions. Nowadays, modularity in product design has been expanded to wider application in the industry. Particularly, product modularity focuses on function and manufacturability issues. With the growing interest in environmental protection, the inclusion of product end of life issues during product design has been seen as a promising method to improve product utilization after its retirement for the purpose of preserving natural resources by prolonging the use of the products or materials. In the literature, however, it was found that very few methodologies were dealing with modularity at the conceptual design stage. With lacking of this available information during conceptual design, it failed to overcome drawbacks that apparent later in the detail design. In addition, there is absence in the literature that explaining on method relating product modularity with product end of life strategies. Most of the product modularity researches are in the tendency of catering life cycle issues rather than product end of life strategies.

In line with the above motivation, this study tries to seek the parameter relationship between product end of life strategies and modular design with structure variation and formulate an optimization method that assist designers to design product with appropriate end of life strategies to reduce environmental impact during product retirement. Frequent variation of product specifications causes assembly and disassembly of components and modules to become more complicated, in which complicate product end of life strategies. Trade off between creating appropriate module in modular design with different end of life strategies is inevitable. Thus, a method of to improve product end of life strategies in a modular design is needed. As a result, the issue of product modular design with structure variation in relation with optimizing product end of life strategies is worthy to investigate. This paper proposed methodology for formulating product end of life strategies in modular design with structure variation. A case study is presented to show the usefulness of the method in modular design activities.
