Product recovery oriented approach for fastener selection during conceptual design

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Abstract

Product recovery and life extension are critical activities in the cradle to cradle life cycle philosophy. These activities are very much dependent on the product's ability to be effectively disassembled into its component or even material constituents. Among the elemental task of disassembly is fastener removal. Thus, when considering the design for disassembly (DfD), many fastener associated factors need to be considered but very few DfD method effectively supports fastener selection especially in the early stage of design. The process of selecting a fastener for its functional requirement is already complex. Additionally, the requirements for disassemblability further complicate the process. This paper proposes the development of a multi criteria decision making model to assist designers in selecting fasteners for DfD. PROMETHEE method was used developing the decision making model for selecting fastener that considers both functionality and disassemblability. A design case study is described to reflect the usefulness of the fastener selection model

Keywords: sustainable design; product recovery; design for disassembly; DfD; fasteners selection; multi criteria decision making methods; MCDM; preference ranking organisation method for enrichment evaluations; PROMETHEE.