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RESEARCH-ARTICLE

Development of Product Recyclability Index Utilizing Design for Assembly and Disassembly Principles


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Designing products for recyclability is driven by environmental and economic goals. Several design for assembly (DFA) rules and parameters can be used to gauge the recyclability index of product designs. These indices can be used for comparative analysis of the recyclability of different products. This assists the designer in making design choices related to the product's end of life. However, many of the existing recyclability indices are only available after design and manufacturing decisions are made. If such design decisions could be made earlier in the design process, when the design space is less bound, recyclability could be considered earlier. A case study is performed to determine if DFA parameters could be utilized to determine product recyclability. The parameters were obtained from existing DFA time estimate tables. The results of the study indicated that the recyclability of the product, as defined by established recyclability metrics, could be predicted through DFA measures. A negative correlation was realized between recyclability and insertion time. Components that required greater time to mate during assembly adversely affected the recyclability of the product. Conversely, handing time was found to have no predictive capability on product recyclability. These findings are used to develop a recyclability index that utilizes the DFA measures, allowing designers and engineers to determine recyclability earlier in the design process.

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