

Use of Function Analysis in the Design of multi-functional products

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Abstract. In the current developing world, Technical Systems are required to satisfy variable customers' needs. This means they should be designed to facilitate multifunctionality with a simultaneous reduction in resource usage consumed for products with many components having minimal functionality index. The proposed approach is to develop a method for components clustering on a functional level to identify functional modules being sets of components that perform a main function on a target component. Such clustering is quantified as a novel modularity index derived from the value equation used in TRIZ and coupled with existing modularity metrics. As a result of the work, a clustering mechanism for Technical System Components was proposed that facilitates the design of modular, multi-variant products. Additionally, the proposed method can help to assess the design from the point of view of its modular structure, indicating areas for further development, including Trimming and Contradiction Defining approaches. The proposed method can reduce the time and costs associated with a modular design. Additionally, designed Technical Systems can be more prone to modifications. In total, this approach can improve the adaptivity of a Technical System, reducing manufacturing costs.

Keywords: TRIZ. Function Analysis. Modularity.