A Methodology to evaluate the structural Robustness of Product Concepts

Abstract:
The success of a company is sustainably dependent on the robustness of their products. Product concept should be designed adaptable for initiated changes but resistant against unforeseen changes. But how can product structures be evaluated whether they are robust? In this study, we present a methodology to evaluate the structural robustness by modeling and analyzing dependencies of product concepts in Multi-Domain-Matrices. We conducted four empirical case studies in industry to test and refine the methodology. The proposed methodology enables engineers to (1) evaluate the structural robustness of product concepts in early phases, (2) compare different product concepts in term of their structural robustness, or (3) deduce improvements towards enhanced structural robustness systematically. The methodology can be applied in all phases of product development process. It supports sustainably the improvement of the product architecture, reduction of change costs, decision making in development processes, and systematic deduction of design guidance.

Stichworte:
structural robustness; complexity management; product architecture; case study