

Problem Modelling for Sustainability in the Business Environment by Linking TRIZ and Systems Engineering

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Abstract. Sustainability has become more important nowadays. Due to the volatility in raw material and energy supplies, together with increasing market requirements for environmentally friendly products, manufacturing companies face the following challenges: a) reduction of environmental impact from own material supply and manufacturing processes (sustainability at the company's level) and b) reduction of environmental impact from products (sustainability at the product level). In dealing with both topics, a company must fulfill multiple targets, in several cases with contradictory requirements. Specially it happens, when fulfilling the environmental targets increases the costs of a product but doesn't increase its main parameter of value (MPV). In the case of the window fitting systems, which is handled in the present research, the MPV is the maintaining of the window state (open, close, tilt and lock). A wholistic picture is needed to understand all the influences and prioritize the topics at both levels (company and product). In the present research, the author uses the linking of TRIZ and Systems Engineering methodologies for quantification between company-level and product-level problems with a deeper analysis of sustainability requirements along the product life cycle and the environmental impact of a company.

Keywords: Sustainability, Circular Economy, System Engineering, Model-Based Systems Engineering (MBSE), System model, Multi-Domain Matrix (MDM), Influences, Engineering Contradiction, TRIZ, Life Cycle Assessment (LCA).