Attribute-based clustering methodology for product family design

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Abstract

One of the critical challenges of product family implementation is to determine the appropriate platform commonality to achieve cost savings and the appropriate variety to offer the necessary differentiation in the marketplace. Even with well-developed product family design approaches, few have tried to solve this inherent commonality/variety trade-off while considering both market/strategy drivers and engineering resources. Absence of these causes concern, as results may yield designs that either require resources beyond current capabilities or offer resource savings that adversely affect market share. In addition, unintended differentiation may lead to wasted resources without any gain in market share. Hence, there is a need to determine the appropriate commonality and variety for product family design approaches, while considering market/strategy drivers and engineering needs. In this paper, the attribute-based clustering methodology (ABCM) provides qualitative guidelines for identifying the appropriate commonality and variety trade-off using market analysis and conceptual engineering knowledge. The ABCM, a matrix-based design tool, aids in clustering the product attributes of product family into a platform and its associated differentiating modules by analysing product attributes' specifications and occurrences across the market segments, and partitioning a product attribute's specification into ranges based upon the solutions used to achieve them.

Keywords: commonality/variety trade-off; product attributes; specification