Development of industrial variant specification systems

With globalisation and increased competition industrial companies must be prepared to satisfy individual customer needs and still stay competitive with regards to lead times, quality, and prices. These factors require companies to be better prepared to handle specification activities during order acquisition and order fulfilment, i.e. the creation of drawings, bill-of-materials, routings, product descriptions, quote letters etc. The present thesis is rooted in the assumption that variant specification systems supporting the cross-functional processes of order acquisition and order fulfilment must be developed from a holistic and strategically anchored point of view. Another assumption is that this is a challenge for many industrial companies. Even though the literature presents many considerations on general issues covering new information technology, little work is found on the business perspectives and the challenge of understanding the variant specification tasks and the connections between variant specification, product development, sales, manufacturing, and information technology. The present thesis seeks to meet this challenge with a procedure, concepts and tools. This is done through an extensive answer to the four research tasks of the Ph.D. project: • Define and describe the variant specification system. • Create a procedure for the development of variant specification systems. • Create concepts, methods and tools to support the analysis and determination of the variant specification task. • Identify solution elements and structural variables to be used in the design of variant specification systems. The thesis presents a “top-down” procedure to be used to develop variant specification systems from a strategically anchored and holistic point of view. A methodology and related task variables are presented for analysing and determining the variant specification task. These are grouped in external and internal task variables. Additionally functional characteristics, which can be used for defining performance measures, are defined. Based in the concept of “focus” different levels of tasks are discussed. A list of structural variables and solution components has been created. These are related to four design aspects in the holistic system design covering the aspects of process design, selection of resources (such as hardware, software and humans), the design of information structures, and the design of organisational structures. The elements in the thesis have been created and evaluated through two case studies. Action research has been conducted in combination with the design and implementation of IT based variant specification systems. One of the case companies has successfully implemented highly advanced variant specification systems. In this company, the subject has been given a high strategic priority, and many new developers have been assigned to continue the development of such systems. In conclusion, the thesis presents a valuable platform for researchers and practitioners doing projects related to the development of variant specification systems.