Chapter II
Product Modeling and Configuration Experiences

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ABSTRACT

This chapter attempts to present an alternative for product modeling based on applied research activities. The model proposed is based on a concept supported by different views: functional, technological, and physical. With the aim of making the model learner-friendly, the chapter also presents an industrial case applied in the lift industry. The specific problems, the model used, the implementation carried out, and the results obtained are described in detail. The objective is to make a contribution based on the industrial practice to one of the basic enablers for product configuration. The final aim is to speed up the supply-chain process in Mass customization scenarios.

INTRODUCTION

The environment in which our companies now conduct business is radically different from that in which they operated only a few years ago (Arana, Lakunza, & Astiazaran, 2005). Ever-increasing demands, both from markets and customers, constant technological evolution, and greater competitiveness from developed and developing countries, means new organizational paradigms and approaches to business must be created.
Among such paradigms, special mention should be made of mass customization (Davis, 1987; Toffler, 1970). Mass customization could be defined as the path taken by organizations leading to the supply of customized and personalized products and services, with efficiency ratios similar to those for mass production. The development of the concept of mass customization, together with the concept of continuous innovation, should enable companies to maintain their competitiveness by establishing differentiation factors that are based on tailoring products closer to customers’ needs.

Arriving at the concept of mass customization is, however, different depending on the point of departure: mass production or engineering-to-order (ETO). On the one hand, companies focusing on Mass Production will need to adapt their products and services so that their catalogues will feature options that are more closely tailored to the real needs of the different target markets. At the same time, companies of this type will need to make production processes more flexible to adapt to a varied output without compromising efficiency. On the other hand, companies focusing on engineering-to-order will have to make a major effort to streamline their products and processes in order to uphold their offer differential, furthermore including efficiency and productivity aspects that surpass current ones.

Whichever the approach, the implementation of the concept of mass customization requires actions in almost every business area and process (Broekhuizen & Alsem, 2002; Hsuan & Skjoett-Larsen, 2003): strategy, new product development, attracting orders, supply-chain, after-sales services, and product end of life.

Besides a suitable development of the strategic approach and the new product development process, one of the main challenges is to achieve the dynamic performance of the supply-chain, both in catering to customer requirements, and in the engineering-production-logistics process.

In short, the challenge is to uphold the service with high levels of efficiency.

With this aim, product configuration is one of the key technologies for a more effective response under the paradigm of mass customization. The aim of product configuration is the development of design software tools and methods that enable swift generation of the technical documentation required for producing the products and services tendered, based on a generic model and the customer’s specific requirements.

Regardless of the area in which it is to be used, product configuration depends on two major factors. On the one hand, there is the actual architecture designed for the product itself and, on the other, there is the model that allows the generic product and the rules, norms, and constraints that define it to be represented.

The purpose of this chapter is to delve further into the latter of these requirements. The aim is to outline the various alternatives required for modeling the product from the perspective of different business activities, and stress is placed on the need to consider multi-view modeling.

The chapter also contains some of the more significant requirements of the different configuration systems, and the relationship between them and all the other legacy systems providing product information.

Finally, with a view to facilitating an understanding of the model being addressed, a real case in Basque industry, the configuration of lifts, is presented.

BACKGROUND

Since the 1980’s, there have been numerous approaches to product modeling from various fields: Computer Aided Design, Design Theory, Production, Configuration, and so forth.

Some of the leading theories that have underpinned the development of an advanced view
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