



Product Configuration – Performance Improvements of Design Work

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Abstract

The design process in construction has seldom been a target for industrialization, as it is assumed to be creative, ad-hoc, and iterative. However, digitalization has opened the door for the integration of design automation into construction through the use of product configurators. Configurators enable the specification of project-specific features from a pre-developed product platform. The case study demonstrates how configurator implementation affects the design process of a noise barrier and project performance. When the configurator is used, the specification process becomes simplified, systematized, and includes fewer iterations. Supporting software ensures information flow, reducing lead-time and production costs. Furthermore, configurator use increased the flexibility to respond to a client's topographical adherence requirements, as well as the blueprint quality and buildability. This case study shows that the design of civil engineering products can be industrialized through the configuration of product platforms.

Keywords: Product configuration, Design automation, Product platform, Design, Noise barriers

1 Introduction

Digitalization has opened the door for the integration of design automation into construction. Design automation can be created by using product configurators, i.e. software that enables specification of a product with specific features to meet individual customers' needs based on predefined limits [1]. In other sectors, the use of product configurators commonly increases performance by increasing quality while decreasing costs and lead time [2]. However, design processes in construction have seldom been of interest for industrialization because it is assumed that they are creative, ad-hoc and iterative [3]. Traditionally, construction is a trade that produces unique, one-off products designed specifically for individual projects [4]. The concept of individual projects implies short-term interactions between loosely-

coupled job partners, a relationship which does not give much incentive to develop practices, methods, and designs that could be reused between projects [5]. Therefore, design process development often focuses on how to manage iterative loops and communicate with the participants conducting the design work [7]. Hence, the ad-hoc iterations of the work progress are assumed to be necessary in realizing the value of the project. For example, Jansson [8] stresses that ad-hoc iterations are necessary in the design process of industrialized projects due to the difficulty in predefining the underlying product platform entirely. In contrast, research from the manufacturing industry has shown that when product configurators are used the design process becomes simpler and requires fewer iterations [9]. In this way, individual customer needs can still be fulfilled, but with less work [10]. Similarly, Wikberg et al. [11] have shown that even the design and engineering work of