First monitoring and analysis of the manufacturing and installation process of timber based 2D modules for accomplishing a future robotic building envelope upgrading

Abstract:
The BERTIM Research Project is funded by the European Commission in order to develop a system for an efficient building envelope upgrading. The main goal of this envelope upgrading consists on adding a new 2D or 3D module onto the building external layer. The modules are made out of timber, thermal insulation and waterproof layers. These modules can also host some functionalities. In a previous phase, a method for implementing an efficient, integrated, modular and customized manufacturing and installation process of the BERTIM modules has been conceived. This method was achieved based on Axiomatic Design. The goal of this method was to generate and to coordinate three main sub-systems: the parametric design and configuration of the 2D and the 3D modules (1), the automated manufacturing process (2) and the rapid robotic installation process (3). The Axiomatic Design was mainly used in order to detect the possible interferences of the disaggregated Functional Requirements regarding the Independence and Information Axiom and the main risks of a
Coupled Design. The first demonstration of the manufacturing and installation process has taken part at the KUBIK experimental building. According to the Axiomatic Design Functional Requirements and the main Design Parameters defined in the previous phase, the demonstrator puts in evidence that the solutions taken don't fulfil the Independence and Information Axioms. The current system can be considered as a Coupled Design. In order to uncouple the system, the TRIZ inventive method has been used, focused on improving loss of time in all sub-systems. The solutions defined with TRIZ methods will be implemented in this three case studies carried out by three different industrial partners. The robotic and automated degree of each case will be adapted to the specifications of each demonstrator.

Stichworte: refurbishing, customization, automated, prefabrication, Axiomatic Design, TRIZ

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