ANALYSING AND VISUALIZING THE MOVING MECHANISMS OF KINETIC ARCHITECTURE

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This research investigates kinetic architecture by examining the technologies that enable its actual movement. The study analyses and visualizes different dynamic mechanisms of selected contemporary architectural projects, by looking at parameters and technologies that facilitate the kinetic system. To make the kinetic mechanism visible, we explore mechanical engineering software, such as "AutodeskForceEffect", "Autodesk Inventor" and others, investigating their advantages and limits. The aim of this study is to facilitate the understanding of the inherent technologies of the system’s moving mechanisms, and their implementation in individual design projects. Provided with a better understanding of the mechanisms, architects are fitted to approach the design of kinetic projects.

Within the scope of this research, "kinetic architecture" is explored as defined by Fox, where physical movement is an integral part of the primary functional and formal nature of the building component (Fox, 2003), and, as added by Moloney, architecture that cannot be reduced to a single moment in time, but is changing by geometric translation, rotation, scaling and material deformation (Moloney, 2011). This research extends the author’s previous study named "kinetic architecture matrix" - a database that establishes a new classification system of kinetic architecture based on "dynamic analysis" from the field of mechanical engineering. The precedents are categorized by the Degree of Freedom (DOF) type and number, i.e. prismatic, revolute / one DOF, two DOF or multiple DOF.

The thereby established "dynamic matrix" implements a unique interface that allows for sorting the precedents according to different categories, inter-
ests or viewpoints, as well as visualizing interdependencies that cannot be observed in a traditional database (Figure 1).

In this study, the previous dynamic matrix is extended by illustrating the moving mechanisms of the projects in the database. 2D and 3D diagrams are created by using mechanical engineering software, in order to analyse and visualize the kinetic mechanisms (Figure 2). The system animations are embedded in the "dynamic matrix 2.0", which is presented at the conference in a digital format.

The "dynamic matrix 2.0" is intended to facilitate a better understanding of and more founded design approach towards kinetic architecture by visualizing movement mechanisms, projects' similarities, differences and cross-references.

References