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White Paper

Building Information Modeling: A Key to Performance-Based Design

Introduction

As buildings assume a broader social and economic role in our cities, designers are balancing form-making with building performance concerns. Issues such as life safety, security, and sustainability are becoming defining characteristics of quality design in this new realm of performative architecture.

Digital technology is the key enabler of performative architecture

To effectively evaluate building performance, designers must now engage in a new dialog with their design model. They must evaluate performance along a specific dimension of interest, modify the model based upon that feedback, and assess its implications. Since a building is a complex collection of interlocking systems, the effect of one design change must be immediately and accurately represented across all dimensions of the building's representation.

Three conditions are necessary to support a true performative dialog:

- A robust, fully-coordinated design model that expresses the design with the appropriate detail and level of abstraction necessary for performative evaluation,
- Analysis tools and techniques that are capable of evaluating model performance and providing meaningful and actionable feedback to the designer, and
- Ways to tightly link performance analysis techniques to the design model and facilitate a dialog between designer, model, and performance analysis tools.

In current practice, many digital models go no further than their analog predecessors. They are simply digital forms of graphical representations containing insufficient information for performance analysis and evaluation. As with traditional physical models and drawings, evaluating building performance based on these graphic representations requires a great deal of human intervention and interpretation.

Only a digital building information model can truly support performative design

A building information model represents the building as an integrated database of coordinated information. In addition to graphically depicting the design, the building information model offers key pieces of data about the building that can be used to analyze building performance.

In a typical scenario, the architect would extract information from the model for use in calculating a wide range performance characteristics, such as heat/loss gain, daylighting effects, air flow, egress under emergency conditions, structural performance and financial feasibility. Specialized knowledge would no longer be needed for data input or interpreting

of results, creating a closer linkage between analysis and design process. "Feedback gaps" for the designer would thus be eliminated. Tightly coupled with the building information model, performance analysis and evaluation tools could now provide meaningful feedback to the design decision-maker, in the context of the overall building design.

As evident in this scenario, building information modeling is a key prerequisite for performative architecture. To realize this vision, architects must lead the way in implementing a building information modeling platform that lays the ground work for a cost-effective and achievable performance-based design practice.

As a sponsor of this international conference, Autodesk commends the University of Pennsylvania for promoting a global exchange of ideas on the very significant issues of performative design.

To find out more about Autodesk's building information modeling solutions, visit www.autodesk.com/buildinginformation.

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