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ABSTRACT - CUSTOM MADE PARAMETRIC DESIGN TOOLS

Freeform architecture had a huge momentum in the past two decades due to the adaption of digital design tools which were first developed in the car and aviation industry in the late 70ies.

Architects, Industrial Designers and Artists were offered possibilities to explore new methods of design which resulted in concepts and geometries very uncommon and unknown for the current building industry.

Very often an initial freeform design gets squeezed through optimization algorithms and squashed into rigid grids, in order to deal with the traditional way of handling a design and construction process. Various “state of the art” architectural designs of recent years show this balancing act between freeform design and economic efficiency.

There still is the current issue of dealing with unitized raw material, fixed transportation sizes and certain fabrication limits. Also the traditional way of thinking how to, for instance, install a cladding system contributes to this.

The design process therefore has to work towards these dependencies and has to integrate these design driving parameters from the start, by means of parametric digital computation tools and their linkage to stream information directly into the fabrication and assembly process.

An ongoing use and development of parametric design tools is therefore a major focus. Building a custom made parametric toolbox based on the very open cad software rhino/grasshopper is a key component, to handle complex geometry. This toolbox also handles data transfer from and to the structural analysis software beyond the standard exchange possibilities.

This allows for a quick geometric and structural analysis already in an early design stage, possible choice of different construction systems as well as joining principles and a precise bill of quantities, generating a perfect perspective to evaluate costs and performance for and by the client.

Flexible yet strong design tools enable for iteration processes and comparisons of different approaches. In most cases only a couple of iterations or variations combined with a proper expertise show the working principles of a system and its corresponding dependencies and variables.

Properly researched, understood and parameterized system models are the genetic information for all spatial design. This is where all design efforts and relating costs should be spent. Even a later change of one of its varying subsystems finds a healthy ground to be easily deployed again.

Future parametric digital design models should be flexible yet strong and easy to send and receive data at any stage to allow for all participating parties to contribute into the building process for a new quality in regenerating design.