

Computer Modeling as a Means of Design

Based on the work of Francois Roche, R&Sie

New advancements in digital technology allow computers to collect, analyze, and replicate data faster and more efficiently than ever before, providing numerous fields with new means of experimentation. Exploration into the natural world and its translation into digital formulas allow computer to mimic nature, bringing us closer and closer to developing a truly living digital world. This new digital world promises phenomenal possibilities for architects, such as Francois Roche from R&Sie, to explore the design process, using digital modeling to derive new forms and ideas, provide new solutions to real-world fabrication, and span beyond the present point in time to put the project into the context of time.

On the surface, digital modeling serves as a means of quickly creating a three-dimensional representation of a design project, allowing the architect to avoid time intensive physical models and drawings that require great effort to change and adjust without providing an overall understanding of the design form. This use of digital modeling as simply another means of communicating an idea serves only to limit the actual potential that digital modeling has for the future of architectural design.

By referring to the R&Sie project “Bitterness” another, deeper possibility for modeling becomes apparent. The computer’s ability to quickly process data and replicate information allows architects to implant a number of design rules and use the computer’s automated processes to analytically produce new ideas. “Bitterness” uses patterns of growth in the natural world to create a web-like structure riddled with organic holes that curve and bend over themselves to create space. The formula-based process removes the human element from the design, letting the architect observe the results of different

design rules while removing the biased human elements from the process. This freedom from the human element opens up the possibility for new design opportunities, previously unconsidered due to the architect's previous experience.

While digital modeling opens up new, complex design possibilities, the exploration of these new designs cannot go beyond the mere theoretical, digital realm without a means of physical fabrication. In the case of "Bitterness," its fluid-like form suggests concrete-like construction, but the constant shifting in the size of the structural components forming the web makes any use of traditional formwork impractical. In order to resolve this problem, the R&Sie team used digital modeling and animation to actually design a long tube-like mechanism with an adjustable nozzle capable of laying down thin layers of concrete one after the other, building "Bitterness" up with the same organic form as its design implies. Once armed with this potential solution, the team actually constructed the mechanism from its digital specifications and tested it in the physical world.

By digitally emulating the potential construction process, R&Sie accomplished more than just discovering a solution for actually realizing their design, they provided a story, a digital rendition of the process behind the design and fabrication of the project. By emulating aspects of the real world within a user controlled digital environment, architects can artificially impose the passage of time upon their design, at once creating an animated story behind the fabrication, function, and passage of time over their design. "Bitterness" animated model allows R&Sie to observe the design and construction of the project at once, communicating to the architect and the viewer the story behind

“Bitterness” fabrication. Digital modeling allows the architect to place the project in an environment and see how it will change and react with the environment over time.

By utilizing digital modeling to its fullest, R&Sie has unlocked an innovative new tool for design process. They can at once separate themselves from the development of the project and involve themselves. They can use a story to understand the project’s function, its fabrication, and how it may respond to changes in the environment over time. By delving into the digital world, architects can at once present their solution, the story behind its development, and how time may affect it.

The development of this “story” in a digital medium creates the opportunity for a myriad of new ideas, previously incapable of being explored. Digital modeling brings a project into a form that can be virtually explored. The architect can investigate new methods of design and techniques for construction, observing the process over a period of time set within a digital frame. By utilizing the story embedded in the modeling process, the architect can at once observe and adjust his or her creation at any point during its inception.