Informing Design through Production Formulations

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Over the decade of the aughts, architectural discourse has charted a new course, and in the wake of the digital effect on mainstream architectural thinking, we find ourselves in a great age of exploration. Research in digital fabrication has moved from the general to the specific, in that it aims to focus efforts related to technological impact on particular cases and variable parameters which contribute to even larger ideas, such as manufacturing, the social impact, sustainable practices, etc. Specific work on building components, coupled with a pragmatic rigor about durability, strength, and production have provided concrete examples of work that spin out of these design-through-production investigations.

To be certain, each new design-through-production project explores unique territory and contributes to the knowledge map by adding to a matrix of possible applications. Still, we align our work with the age-old discipline of architectural thinking, while privileging “Making, Materials, Performance, Form, and Function.” Indeed, form is informed by performance! The principles that govern the human decision-making, in light of this new kind of digitally generated work have yet to be clearly articulated, but techniques and methods have expanded to create new opportunities for making architecture. In fact, research has tended to be less about framing the new principles for making digital architecture and more about adding specific cases to the knowledge base, as each new project helps to define the collective body.

Early comparisons of digital fabrication were forced into a critique as being a part of a “neo baroque,” as scholars attempted to situate the movement as it progressed towards a more visually rich informed architecture. “Neo-baroque” fell to the side once we had to translate construction information out of surface modeling projections. Production demands for fabrication and assembly aligned us more solidly with retooled industry that could adequately take advantage of the coming demand for digital architecture. Information sharing through production realities led to tales of a “neo gothic,” and the “Master Model/designer-builder,” further reinforced by devising practice strategies for translating innovative form at 1:1 scale. Making implies craft, if even machine craft, and ideas about an “architecture neo-nouveau” surfaced led by informed automated machines. These “neo” connotations are rich with associations for architecture, yet they all have seemed to sink below the surface in our desire for charting this new paradigm.

Alongside the theoretical rudders steered towards advancing emerging processes of digital design and fabrication, are the essential pragmatic applications of production knowledge that truly keep this discourse afloat: a material must perform according to the laws of physics, a fabricator must be able to manipulate the material according to budget, equipment, and time constraints. Industry partnerships, coupled with research, testing, and development have become key ingredients to informing form.
Additionally, today’s digital designer needs to be well versed in the interrelationships between geometry, digital modeling, parametric organization, structural performance, fabrication, and construction techniques. The papers included in this session are significant as they contribute deep explorations into the diverse range of techniques involved in the “making” realities of the design-through-production methodology. This particular case-based scholarship is welcome to the discourse as a useful reference catalogue for emerging practices and inspiring new methods of production.

Each process/project charts a similar course, while altering the input variables. Each operative strategy of folding, carving, bending becomes a unique problem as it applies to different material performances. These papers examine subtractive or operative techniques in materials such as steel sheet metal, stone panels, and sheet rubber. They also consider additive or transformative techniques in materials such as concrete, foam, and metal rods.

Beyond materiality, the scholarship here highlights the fact that information management is critical to the digital designer, as these papers examine a range of information from bend angle data, prototyping tolerances, translation to Kuka Robotic Language, customized algorithms, and geometric rationalization.

As has always been the case in architecture, it is clear that each project carries with it design considerations as the dominant intent and that formations are informed by material limitations, formulating details, and scaling up to full-scale production. Every projection adds to the matrix of techniques. Each one serves as a useful guide to further work. Collectively these projects interrogate different materials, different fabrication devices, and different form generation techniques. But, together, they make significant additions to the map for the future of architecture.