## Conclusion

Structure can be understood as a series of physical interventions used to support or execute a design concept. In this respect, the quality, rhythm, and complexity of the structural elements are powerful design outcomes that can be used to help articulate space, establish hierarchies, create thresholds, define circulation, modulate compositions, and, best of all, define experiences. These attributes represent a performative aspect of structural design that is uniquely architectural. Many designers do not avail themselves of the opportunity to explore structural design at this level for fear of creating architecture that is subservient to a chosen structural concept rather than an expression of the original design idea. When the structure is approached at the same time and in the same manner as the architecture and is motivated by the same design intentions, however the result is unequivocally stronger because the design concept is universally legible, profoundly integrated, and consistently applied. A comprehensively satisfying and aesthetically conscious solution to a design problem must recognize the potential for structure to enrich if not create architecture.

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# Behind the Curtains: Backstage

## Burak Pekoglu

**An architectural project can be thought of as a theatrical production. A building becomes a stage after it is completed; those who build are actors who present the inhabitants–the audience–with the experience of the building through its very presence. The word architecture itself originates from the Greek αρχιτεκτων which means master builder, proposing a connection between the notion of the director in a play and its field of action, the theater. There is therefore an opportunity to define a relationship between theatrical production and architectural production in this light of establishing the architect as the director. The design idea is originally conceived by the architect, who directs the complex process of building, in which the contractor becomes an actor, and finally the end users serve as the audience of the architectural product. The site becomes a stage of hidden processes that determine the outcome of the design project.**

Let us assume then that the architecture project, the building, could be perceived metaphorically as a play. The play could be staged at any particular location and actors, builders, and audience members multiply in relation to scale and theme. The project's effect can vary relative to the budget, theme, time, politics, place, and quality of its production. Most important is to make the audience believe in the performance. The building should perform in environmental, structural, economical, programmatic, contextual, and cultural dimensions. The outcome, as the performance, is determined by protagonists supported by the efforts of backstage teams, throughout the project. There is no particular way to orchestrate the production.

Accolades are awarded to those whose performance wins the applause of the audience. The relations and communications among them fluctuate in the spirit of the play. There is no formula that defines or records events in this multifaceted arena, where protagonists and backstage teams operate toward one coherent composition.

The play may be defined as preceding cinema in light of recent technological advances. Here we could introduce another metaphor by comparing stage and screen. The screen in cinema replaces the stage of the theater, as the art of drafting is replaced by digital drawing. The formats of these two methods of drawing are similar in their essence. Their output follows a similar language, where the speed of orchestration and experience of the audience are upgraded to vast visualizations through the medium of the screen. The projects are operated under new tools and communication techniques. Digital fabrication allows exploration of new means to translate composite surface designs to per formative material compositions. However, the backstage accommodates a series of different activities. Prior to the realization of the built product, the crew of architects, engineers, and contractors define core text and chapters of the play that is about to be staged. Here, learning and borrowing may come from the automobile, fashion, and aerospace industries. Although change is slow at the building industry, new lenses and screens propose a reconsideration of existing standards. Acquiring tools and technologies from other industries allows alternative possibilities of performance resolution to foster.

The last three decades have transformed the imagination of the designer into a more fluid and complex model of narration. Through the use of technological advancements, architecture has transitioned into the production of smooth and continuous surfaces. The cinema, having the ability of montage, is parallel to the limitless potentials of manipulating the surface in architecture through software. On screen editing becomes the way designers think as building culture advances. Data can be easily sent back and forth among all the participants in the theater of architecture. As processing speed is multiplied, it demands clusters of collaboration.

Editing can happen from a global scale to a local scale, until it reaches the audience as a final composition-image. The imagery that accompanies the new digital project of architecture does not necessarily display the reality of the architectural product. In this case, the spirit of the play is a mere suggestion of the intentions of the actors. The reality itself is not a static and defined image; it changes and transforms as influenced by the integration of these exact technological tools in the process of building.

The course "In Search of Design Through Engineers" given at the Harvard Graduate School of Design in the spring of 2010 evolved through six case studies, built architectural projects that present the engineering effort of Adams Kara Taylor (AKT). Interaction and collaboration between the architect and the engineer proposes a deeper analysis of the communicative potentials within contemporary practice. In this debate, the evaluation of traditional technologies of the recent past in relation to the production of contemporary design became a central theme.

The chosen projects were dissected in terms of their design conception and construction methodology, followed by careful analysis of the processes and technologies involved in their realization. This dissection demonstrates the temporal, climatic, political, and environmental contexts in which each of the projects were conceived. By re-designing certain components of these projects, one is led to a series of speculations on the opportunities for alternative solutions on given problems of planning, structure and infrastructure. Both the spirit of expression and the efficiency of construction were identified and used to inform the model of study. These studies address the challenges identified with concrete design and engineering proposals, establishing a model of practice in which the engineer becomes an active agent of design in the early stages of the architectural project, beside the architect.

Hammerson's Highcross Quarter Shopping Center by Foreign Office Architects reveals problems of the envelope, site strategy, and program in its realization. Understanding the decisions made in the sequence of design evolution is crucial to recasting or redirecting the whole play. The patterns of production in this case had to address the architects' aesthetic concerns, which resulted in textile becoming the concept for the envelope of the building rather than choosing to contain the mall as an opaque mass. The concept of the envelope manifested in the façade pattern. More precisely, this transformation took place in the process of exchange between the architect's fabrication design and the installation techniques devised by the engineer. Large components of the program, however, such as the adjacent movie theater, had to be resolved separately. The adoption of various systems and façade solutions caused programmatic and budget issues to be resolved under pressure. For better or worse, decisions had to be made fast given limits in time and budget.

In each project, design processes are unique in their constraints and paths toward risk taking. In the case of the Phaeno Science Center by Zaha Hadid, the ambitious stressing of the envelope challenges the continuous form in a redefinition of the monolithic structure that holds the building's programmatic and technical components. Here the idea of of form determinate in the architect's mind needs to be accompanied by the engineers' ability to meet the challenges. AKT frames such collaboration in its research potential of learning. The project can be conceived, as well as documented, as solving the problems of communication between the idea and the materialization of the building.

The orchestration of Phaeno takes place in Germany, a country dedicated to advanced manufacturing techniques and methodologies. The type of concrete used in the construction of the building, however, caused a significant delay due to the time necessary for its approval by the local authorities. Even though the advanced testing of concrete technology in the context of the project presented numerous benefits for the advancement of material science, in this case it seems that the choice of such material, with its inherent difficulties, presented a challenge despite the desired aesthetic effects. Yet there are undeniable benefits to sponsoring material research as a part of the architectural project. New challenges and potentials are brought to light with the extensive documentation of the backstage processes, which highlights the characters' beliefs in the play until they manage to stage its complete image. The audience is meant to be shocked and engaged in a truly new way. In addition to the initial exterior perception of the building as a monolithical sculptural object, the inhabitants discover a radically new expression of expansive spatiality, layered light structures, and materials in the interior of the Phaeno.

With the Henderson Waves Bridge by IJP Corporation, George Legendre opens up a debate concerning the stylistic approach of design and its implications for the process of construction. A small office in London won a competition in Singapore. The process deals with cultural disjunctions toward achieving the desired result. Legendre's specific approach to design, where math equations become a sketch for a tectonic form, raises an interesting set of problems in the consideration of aesthetic qualities and suggested structural functions. When the sketch model of the bridge translates into construction, gaps rise from lack of control. The architect's limited role during the construction phase results in unwanted alterations of the initial model. As a consequence, the director loses control over the production of the image. The collaboration among the agencies becomes crucial to the project's implementation from concept to finished structure.

The Queen Mary Housing Project by Feilden Clegg Bradley is realized with the support of AKT. In this example, the tunnel form is revisited to address limits of time and budget. In this case, the approach was to tweak the units' organizations to gain architectural qualities of surface depth and dynamic over the façade. The tunnel form idea becomes the DNA for the units' aggregation within the limits of planning regulations and construction methods. Through façade additions to the north, rooms gain interest in their intrinsic layouts. The riverside block advances the image of the project in its alternative layout of unit windows and copper cladding.

Feilden Clegg Bradley architects challenge sustainability measures in their Heelis—National Trust headquarters project. Environmental analysis software becomes a tool for their intuitive design strategy. The skylight details and arrangement become the characteristic of the mat building, enhancing a monotonous building envelope while reflecting the directors' image by avoiding variations. In both projects, linear design thinking is prevalent, based on repetition of certain building elements with little variation.

The Adelaide Wharf Housing project by Allford Hall Monaghan Morris Architects demonstrates ways in which its courtyard typology is comfortably situated in its urban context. Potential dead spaces are activated in their organizational and spatial layouts. They enhance a safe access to the building, while trying to portray a social space. The bright colors add up to positive feelings in the audience, facilitating a closer connection with nature. In this scheme the strategies of architectural play become essential in the way they define the character of the project.

The social housing projects by Feilden Clegg Bradley architects and Allford Hall Monaghan Morris architects demonstrate the attachment to the live stage, where standard methods, manual

labor, and linearity are still in control of architecture for economic and cultural reasons. These are two positive examples of how to rethink housing projects given their persistent limitations. Digital architecture excludes itself from this range of architectural production. Its presence is restricted to cultural and commercial projects, as it is apparent from the Phaeno and Shires examples. These tend to be more open to integrating the digital spectrum in the building process.

Editing is the key to arriving at creative architectural solutions. The cinematic thinking of being able to manipulate a single frame in relation to time and space could open up new possibilities for designers to think as creative directors. Speed matters in the way a director can alter design, increase the pace or slow it down, always responding to formal, spatial, and programmatic conjectures. The script is the framework, and the characters that control it can determine the spirit of the play, which is then experienced by the potential audience—the users who live in it. Within this scope, the complex process of architectural production reveals itself in the way it translates from a concept to built form, projecting one or multiple images. The image itself is translated into form, action and scenario, a trio that can describe the outcome of the built reality. In this light the architecture's capacity to transcend characters and capital becomes preeminent. In the final realization of architecture, projects are conceived as performative case studies when viewed as the experience and the documentation of the process itself.

# Surfing the Wave

Murat Mutlu

**When writing about Manhattan in *Delirious New York*, Rem Koolhaas suggested that the success of this city relied on the fact that its architecture had surrendered itself to the needs of the metropolis. This kind of architecture has the same relationship with the forces of contemporary trends as a surfer does with waves.[1] To follow the movements of reality is to synthesize observations from the real world in making design decisions. Without collaborating with actuality, the designer will get lost in irrelevant abstract visions. To surf the wave, any contemporary design practice needs to derive its aspirations from available opportunities, which requires a comprehensive knowledge of the constantly evolving market. Each opportunity—or hybridization of opportunities—becomes a design instrument with which the designer can develop ideas. Our skills as designers come from being able to design with what is already out there, rather than proposing ideas and forms that are derived from our fantasies of a controlled utopian world.[2]**

**Integrated Design Process**
In the past, the "master builder" was able to comprehend all of the knowledge needed to construct an idea. When designing a building, he would know what materials needed to be used in what form, how the loads would be distributed in the structure, how the public would engage with the space. Because the knowledge necessary for designing the artifact was contained in one mind, the process of design was incorporated with these constraints of materiality from the outset. In the contemporary world, however, it is not possible for one design practice or practitioner to have a meta-knowledge of construction technology, material science, structures, urbanism, information technology, and other fields required for a design to materialize. The industrial revolution introduced building materials such as iron that were new to the traditional master builder. To surf the wave of that time, the master builder/architect had to formulate his design knowledge about the new way of constructing forms by collaborating with experts. It is no coincidence that this was also when the structural engineering profession emerged.

Since the industrial revolution, in a traditional design process the architect will develop a formal concept of his or her design solution to the given problem that often lacks relevance to real material issues. It is not until the designer completes the concept that the building engineers start rationalizing the initial form. Among the critical avant-garde architecture practices, it was OMA that started working closely with an engineer, Cecil Balmond of Arup.[3] For them, the desire to explore opportunities led to collaborations with engineers knowledgeable about the potentials of materiality and also aware of industry-standard construction and fabrication techniques. This collaboration enabled the projects to be conceptualized with real material and construction issues taken into account from the beginning of the design process. For instance, in the Maison à Bordeaux project, this early collaboration enabled OMA to perforate the floating mega concrete beam—which also acts as a façade—to create windows for the rooms inside.[4]