

## A Lofty Index

### The Skyscraper in the Age of the Digital Revolution

By Neri Oxman

"What is the chief characteristic of the tall office building? It is lofty. It must be tall. The force and power of altitude must be in it, the glory and pride of exaltation must be in it. It must be every inch a proud and soaring thing, rising in sheer exaltation that from bottom to top it is a unit without a single dissenting line."

—Louis Sullivan's *The Tall Office Building Artistically Considered* (1896)

If there is one feature which characterizes the Modernist project in the twentieth century it is the skyscraper. In its vast scale and immensity the skyscraper has, by spirit and tradition, testified to the edge of design knowledge: in merging the idioms of architecture, engineering and technology, it has far exceeded any recognized typology in its cultural significance and impact upon design discourse in modern times. Since its invention during the 1880's, and triggered by the industrial revolution, engineers began experimenting with iron and steel, architects have explored the vertical curtain wall, and historians have marked the evolution of a new type. The skyscraper had it all: loftiness infused with market value, exuberance with engineering genius, urban ideals combined with place making. Modern masters owe their life to it, and for the Beaux-Arts avant garde, it was the *raison d'être* that brought down classicism. All in all, the skyscraper alone preserves the narratives of modern cultural and technological production. However, where there is novelty – there is crisis. And it is here to stay for the 21<sup>st</sup> century for as long as we grant it authority.

The skyscraper's architectural features, its urban presence, and the technological challenges it had presented to a generation of builders, have all contributed to the consideration of its value as iconic. Cities such as Beijing and Dubai are designed today in a manner which promotes their towers as a gateway for a thriving economy; construction workers are hitting new grounds in the Far and Middle East with a tower-per-day mentality; and global leaders consider it as the enabling mechanism for the establishment of identity. Since its origination, the skyscraper has served as an *obelisk* of the Modern movement. As a result, it has never transcended its value as an architectural, and indeed, an urban icon. In this light, the skyscraper has been traditionally associated with the *image of the new* as opposed to its functional expressions; It has abused the environment in prioritizing monumentality over responsiveness and adaptation; it has claimed to move forward technological innovation while regarding it as no more than an agency of production; in its repetitive nature, and homogeneity, it has valued structural and programmatic redundancy over efficiency

and repetition over difference. It is nothing but sustainable and considering our earthy carbon footprint, it is nothing but the *noble lofty*. How may we overcome the syndrome of the obelisk?

Some have tried before us. In his *Delirious New York* Koolhaas proposes the contamination of program with mixed use by introducing unexpected functions juxtaposed with other programs. However editing functions and human activities was not always productive. There was an urgency to go beyond program.

A new generation of *digerati* architect and designers is now attempting to overcome the skyscraper's iconic crisis. They constitute a new avant-garde of design and are the cutting edge of contemporary architectural theory. Furthermore, occupying the boundary between theory, technology and practice, these digital designers/researchers are now advancing the theoretical frontier of design at the speed of technological development. Supported by elaborate 3-D environments promoting the generation of form and combined with state-of-the-art digital fabrication technologies, we are now facing the *Difficult Tall* (to paraphrase Venturi's search for architectural unity while promoting complexity and embracing contradiction). Our tools are bigger, faster and more efficient than ever. With them we can analyze, optimize, regenerate and evaluate a range of structural, environmental, and indeed social patterns of and for habitation. Adhering to a paradigm promoting difference and heterogeneity, where local control and behavior is made possible, we can now move forward from the *icon* to the *index*.

In Pierce's own words and followed by a generation of post-structural linguistics, the *iconic* stands in complete contradiction to the *indexical*. While the icon may be defined as an image that physically represents what it stands for, an index is defined by sensory features. The icon mimics or gives attribution to a singularity by way of contracting meaning through image; the index correlates with that singularity by mapping it relative to a given function. To demonstrate, the *iconic* form of a skyscraper withstanding north-west wind loads would be that of a twisted pyramid perhaps along with its monumental implications and random meanings; at the same time, its *indexical* representation would map every formal feature to the given vertical index of wind loads as analyzed and charted by the designer.

More specifically, by employing dynamic spatial arrangements against the traditional organization of core and space, now made possible by digital media, we may dissolve the dichotomy between building and city, circulation and habitation, structure and skin, and other binary axioms in tall building design. These methods propose spatial layouts that establish heterogeneous movement, and not just assorted practices, as the criteria for a dynamic assemblage.

The distinction in design approach enables us to incorporate environmental, structural, social and urban conditions as lofty indexes informing the distribution of matter across its height. The implications are vast: the canonical floor space may be modified to enhance the absorption of light, relative to the building's

orientation; The circulatory system – the elevator – so endemic to the type, may be treated as an entity which introduces sectional difference within the building; Structural load may potentially inform the interaction between load bearing components and skin features to result in a multitude of material organizations locally informed by weight and weather; and finally, environmental control could be made more efficient when allowing for natural ventilation to occur where possible.

Combined programmatic, urban, environmental, and technological aspects of designing, building and living tall – are now promoting a new paradigm that may permanently alter the modern vertical canon.