# Towards A New Design That Breaks the Traditional Structural Base for Building Design

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## Abstract:

Thinking about architectural form differed significantly, as new concepts, techniques and design operations have emerged that broke the base of architecture and directed thought towards freedom in form, design and studying the relationship between them. Also, the theory of the skeleton gave way to its leather theory, flow and continuous surfaces, which are all of an architectural shift that documents the development of the new relationship between the engineer and technology, and on that the surface has gained depth, complications and new behaviors have changed, and here lies the research problem as the research seeks to prove that the building is not existing on the idea of the traditional beams, columns and facades, such as the bones that the skin covers.

Rather, the building has become based on the idea that it is made up of muscles and nerves. The research also seeks to take advantage of the new trend towards a free building that greatly breaks the virtual reality and studying the development of the concept of form in architecture and morphology of the building and its development and analyzing some of the projects that support this modern thought.

## Key Words:

Morphology - Deconstruction Architecture- Architectural creativity - Construction analysis.

## الملخص:

في وقتنا الحالي وعصرنا الرقمي ومجتمع المعلومات اختلف التفكير في الشكل المعماري بشكل كبير فقد ظهرت مفاهيم وتقنيات وعمليات تصميم جديده تكسر القاعدة الهيكليه للعمارة وتوجه الفكر نحو الحرية في الشكل والتصميم ودراسة العلاقة بينهم. كما أن نظريه الهيكل العظمى أفسحت المجال لنظريه الجلدية والتدفق والاسطح المستمرة. وهي كلها عباره عن تحول معماري يوثق تطور العلاقة الجديدة بين المهندس المعمارى والتكنولوجيا الحديثه وعلى ذلك فقد أكتسب السطح عمقا وتعقيدا وسلوكيات جديده قابله للتغير وهنا تكمن المشكلة البحثية. ويسعي البحث إلى إثبات أن المبني غير قائم على فكرة الكمرات والأعمدة والواجهات التقليدية كالعظام التي يكسوها الجلد بل أصبح المبني قائم على فكرة أنه مكون من العضلات والأعصاب. كما يسعي البحث إلى الاستفادة من التوجه الجديد نحو عمارة حره تكسر الواقع الافتراضي بشكل كبير ودراسة التطور لمفهوم الشكل في العمارة والمورفولوجيا للمبنى وتطورها وتحليل بعض المشاريع الداعمة لهذا الفكر الحديث.

**الكلمات المفتاحية:**
جزيئات الذهب النانويه، النانو تكنولوجى، الاشجار المضيئه

## 1.Introduction:

The building's efficiency and architectural appearance of the building has become one of the most important areas of architecture. By the help of computer, it became easy to achieve complex forms, as it was difficult to achieve this with old traditional means. There was a major architectural event when concrete changes occurred in the form of buildings. The effect of this change appeared on a world dominated by traditional reality, this traditional design depends on a constructive building based on the beam and the columns and covered with fixed facades, and these ideas remained dominant until 1971.

Here the disintegration architecture and its appearance appeared completely, the architectural thought and its architectural view of the shape of the building. With the emergence of digital technology, the development of modern building materials and the enjoyment of new characteristics, the response to this development and interaction with it has become impossible. These liberated and fragmented buildings record great changes and mutations and have helped create new buildings and complex and distinctive models. With twins between the inside and outside of the building and the relationship between them so that this internal space is not just a remaining area of outer surfaces. Thus, the traditional structural base has been broken using a new design that reflects techniques, civilizations and aesthetics in modern society.

## 2. Research Problem :

Always go towards traditional architectural design and adhere to the restrictions imposed on architectural thought. Architectural engineers believe that the building does not distract from the structural framework and its base is the blanket, columns, and fixed traditional facades.

## 3. Research Objective:

The idea that the building is a skin and bones must be changed, as the architect (Mies van der Rohe) and the intellectual trend towards new forms exceeded the usual range of the shape of the building and create free forms of surfaces.

## 4. Defining the Concepts of Research:

The morphological research has identified the deconstruction architecture, architectural creativity, construction analysis, and the research seeks to take advantage of these terms to obtain a new design that breaks the structural base and becomes a building of nerves and muscles.

### 4.1 The Definition of Morphology

Morphology is a Latin term consisting of two morphic parts, meaning the form of biology and science [1]. Morphology is the science of studying the form of anything and is applied in each science according to its data [2].

Morphology in architecture is a science that studies the structure of architectural forms [3], for artists and engineers have introduced this term to architecture to emphasize the need to study

its structure has become many architectural schools based on traditional methods because they accepted to continue on the base and previous design methods but after the advent of digital technology has had a significant impact on the change in the morphology of modern architecture.

### 4.2 The Definition of Deconstruction Architecture

The philosophy of Deconstructive architecture means stripping and shaping basic geometric shapes together in a way that is not a minority to express certain cultural or critical ideas. Deconstruction architecture means out of the ordinary, deconstruction architecture is the trend of a distance from classicism [4].

### 4.3 The Definition of Architectural Creativity

Architectural creativity is the architect's ability to imagine or invent new things by combining ideas and modifying them or changing them [5].

Architectural creativity is a combination of imagination and flexible scientific thinking, to develop an old idea or to find a new idea, no matter how small, resulting in an unusual lyrical production, which can be applied and used [6].

### 4.4 The Definition of Construction Analysis

Construction analysis is an analysis of the architectural mass to its basic components, and then identify the different blocks to which these components belong, and then link these components to the possible methods of solution and through it the designer gets new architectural blocks [7].

## 5. Defining the Method of Morphological Creativity:

By tracking the study of morphology in fact, morphology stems first and then architects extract from it the final architectural formations of the building where the goal becomes to achieve the aesthetic form with the prowess of construction and adapting the morphology of space to the function, and design each vacuum according to its morphology, nature, features, visual pleasure and function.

This leads to the creation of two sets of interior spaces consisting of several sizes of spaces and exteriors that close them, which leads to the need to connect the internal and external spaces in the design clearly while providing privacy for each vacuum so that the goal of modern morphology is to form surfaces and blocks in an engineering artistic way that creates spaces to achieve utilization artistic pleasure through balanced and tight relationships directed to the conscious and unconscious mind of man by moving from stillness to movement, and from descent to ascent, from solid mass to suggested movement in addition to harmony with the environment [8].

## 6. Techniques for Analyzing the Morphological Construction of Arc Architectural Forms:

The Morphological architects used the construction and then laid the term as recognizable as follows:

### 6.1 The Process of Transformation

It is to transform the shape of the building from the traditional system as a column and straight lines to the deletions and additions of the building where the morphological construction

becomes visually balanced and integrated with the external environment and makes the interior vacuum part of the external environment as Fig .1.

**fig. 1. sc johnson fortaleza hall the horizon projection of the base hall shows the oval shape added to the building's main block and the inner space of the added hall [10].**

### 6.2 The Assembly Process

The formation of the building by dividing it into separate masses assembled in unconventional ways and connected together by internal corridors and this morphological construction and its functional and environmental impact lies in the interconnection between these blocks instead of being a single mass of shocks that feel monotonous and boring as Fig. 2.

**fig. 2. fuji network radio building, tokyo, japan, 1996, by kenzo tang [11].**

### 6.3 The Process of Bending

The process of changing the linear path in one or more distances is illustrated here by the formation of a curve construction structure that corresponds to the surrounding environment as Fig. 3.

**fig.3. bosjes church was built in london's brady river valley by: coetzee steyn of steyn studios 2016 [12].**

### 6.4 The Process of Extension

It is a process of changing that occurs for spaces in one direction. Therefore, the apparent dimension increases without changing in the other dimension as Fig.4.

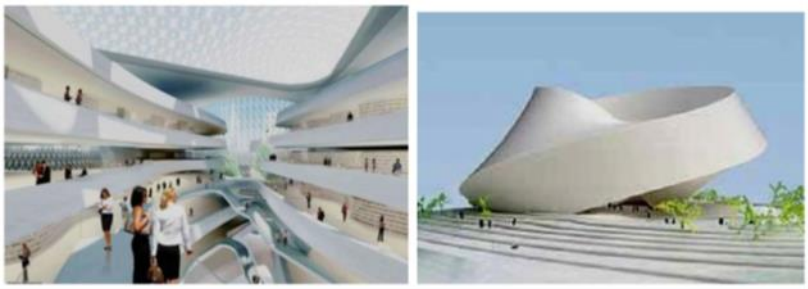

**fig. 4. national library of kazakhstan by: bjarke ingels 2009 snail-shaped [12].**

### 6.5 The Transition Process

The morphological structure in this relationship depends on the change of position of the plastic structure in relation to the spatial dimensions where a new relative relationship is given to these vacuum dimensions as Fig. 5**.**

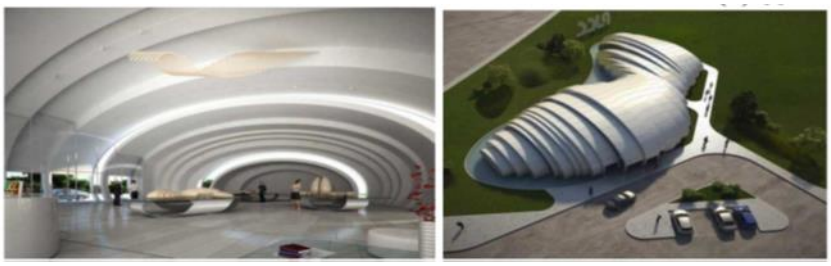

**fig. 5. suite pod in kuala lumpur, malaysia designed by: engineering group [13].**

### 6.6 The process of rotation:

Here, the morphological structure becomes a change in the position of the plastic structure while participating in the rotational axis as Fig. 6**.**

**fig. 6. temple baha'i by: hariri pontarini architects in chile 2016. [14].**

### 6.7 The Communication Process

Results from the assembly of adjacent vacuum bodies visually connected with each other and with the outside world with a similar or non-symmetrical composition symmetrical in uniform balance so that they are connected to connections in compatible proportion according to relationships, methods based on the use of Logic, good behavior and conscious flexibility, as Fig. 7**.**

**fig. 7. miami science museum, usa [14].**

## 7. Deconstruction Architecture:

### 7.1 The Emergence of Deconstruction Architecture

Deconstruction Architecture not just an architectural movement or style, a name that appeared in the 1971, but a major cultural phenomenon that is one of the most important modern developments in art and architecture of the present era. It is a critical and a philosophical style, at first it originated from the work of the French philosopher Jacques Dredd. These works were fundamentally distinguished in the authenticity of the apparent form of things and the traditional discrimination in them. A star ascended a trend during the end of the 20th century. The current of the structural style of the 1930s, and the boiling of revolutionary feeling in the world, which in some respects calls for the evasion of the capitalist past [15].

### 7.2 Philosophy of Deconstruction Architecture

The call for architecture to move away from the rigidity of natural connotations and traditional conflicts and demolition of all the foundations of the engineering minority and the dismantling of facilities to parts and the reconsideration of relations whether human or urban. In his new modernist book, the thinker Charles Jenkins says that disassembly is the architecture of fracking and asymmetry. A building full of unexpected surprises uses the vocabulary of classical architecture in reverse classical architecture and against classic difference, dimension and criticism of all that is traditional and familiar.

### 7.3 One of the most important pioneers of deconstruction architecture

Zaha Hadid and Frank Gehry.

## 8. Analysis of Projects for Some of The Pioneers of Deconstruction Architecture:

This new tendency in the architecture is based on complete volatility and the lack of a reference for a specific cognitive structure. It is a building that depends on philosophy and emphasizes the rebellion on everything that is classic and traditional. Each building reflects the thought of its designer only. We will review several businesses for some of the disintegration of architecture to learn about the philosophical vision used in the design. Among the most important people from the pioneers of this thought **(Bernard Tschumi) (Zaha M. Hadid) (Peter Eisenman) (Daniel Libeskind) (Frank O. Gehry).** The focus will be on only two in our research

### 8.1 Analysis of Projects of Zaha Hadid

Zaha Hadid al-Iraqiya was one of the most prominent architects of our modern era. In 2004, she became the first woman to receive the Pritzker Architectural Prize, referred to as the Nobel

Prize for Architecture. Zaha Hadid has used all morphological construction analysis techniques in her work, and this is evident by analyzing the mass design of some of her works. **Zaha Hadid's philosophy:** Its style was dependent on the idea of creating a zigzag and curved flowing form that express a reflection of nature. Like the mountainous nature or the currents of the sea waves. She ignored in her designs rules of the game and produced a building that does not belong to a place or time.

### 8.1.1 B.M.W. Building in Germany

BMW Central Building is an architectural metal works in the northern part of Leipzig, Germany. Hadid won its design in 2001, and construction began in 2003 until its construction was completed in 2005 [15]. The building's design was that its future area could increase horizontally, as it contained spaces between its construction able sections. The building consists of three different sections. The building consists of three different and separate sections from each other, only corridors link them. Where each section was designed to have a custom role in the production and car manufacturing process.

In this building the architecture used both the transformation process as Fig. 8. as the assembly process as in Fig. 9. and used the extension process as Figures. 10,11. and used the rotation process as in Fig.11and used the process of communication as in the Fig. 12.

**Fig.8. Transformation process.**

**Fig.9. Assembly process.**

**Fig. 10. Extension process.**


**Fig.11. Rotation process.**

**Fig.12. Communication process [16].**

### 8.1.2 Haidar Aliyev Cultural Centre Baku, Azerbaijan

Haidar Aliyev Centre is one of the world-famous cultural centers, designed by Zaha Hadid located in Baku, Azerbaijan, opened in 2013 [15]. The center has changed the patterns and concepts of urban design in Azerbaijan. The architecture through and its design highlighted similar bends to the total area of the center which is about 100,000 square meters.

The design idea depends on the link between the interior and the outside and the creation of a continuous relationship between them.

And the exploitation of these relationships and ripples to direct the visitors of the building through different levels inside the building. The building is separated into 3 parts, but they are linked under one roof. This is directed to the disintegration architecture. The construction system of the building is a system (space frame) and the concrete system. The two systems are linked by setting up the building with the concrete system and covering it with a system (space frame).

In this building the architecture used both the transformation process, the curvature process and the extension process as Fig. 13,14.

**Fig .13. Transformation process.**

**Fig.14. Curvature process [17].**

### 8.1.3 City of Dreams" Tower Hotel Macau, China

It is a 40-stores hotel, an architectural and technological breakthrough – The first exoskeleton freeform world on the rectangular site is the monolithic block, with carved emptiness creating a mix of wall and roof caps, previously unseen in traditional architectural design. An exoskeleton mesh structure embracing its concrete core emphasizes its volume.

Beyond the more intriguing sensuality eye, the structure provides lateral stability of the building and minimizes internal structural requirements for optimal interior layout. Morpheus is the first high-rise building in the world supported by a steel structure exoskeleton free form for accommodating a mixture of various installations in a building having two cohesive sky bridges,

five different glazing systems and a coating of aluminum double curvature nonrepeating architecture used transformation and assembly as Fig. 15.

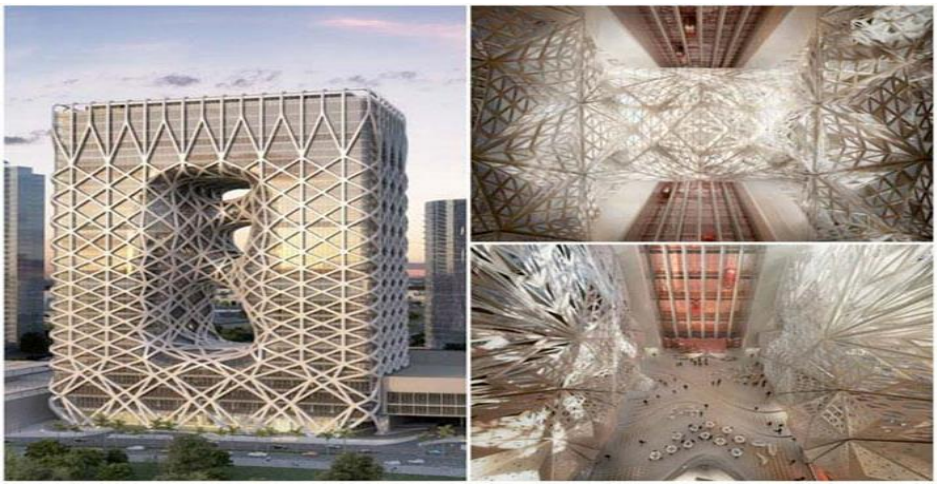

**Fig.15. Transformation and assembly process [18].**

### 8.2 Analysis of projects of Frank Gehry.

Frank Gehry born in Canada in 1929, Frank Gehry is best known for his unique and somewhat exotic designs that begin in concept and end randomly. Therefore, he is the owner of the strangest buildings in the world.

One of the features of his works is an autopsy of the mass to small units in a sculpture style in architecture and is famous for using the flowing blocks covered with metal using titanium chips in his facades for buildings.

#### 8.2.1 Guggenheim Bilbao Museum

It is a museum of contemporary art and is located in the Basque city of Bilbao, Spain. It was built on the banks of the River Nervion, which runs through Bilbao to the Atlantic coast. Guggenheim Bilbao is one of the museums belonging to the Solomon R. Guggenheim Foundation and opened in 1997 [15].

The museum consists of organic oceans radically carved because it is located in a coastal city, the museum looks like a ship. This work belongs to the decorative direction, which is an irregular assembly of the masses covered with titanium with stone blocks and glass walls. In this building, the architect used transformation, assembly, extension, rotation, transition, bending and communication as in the Fig .16.

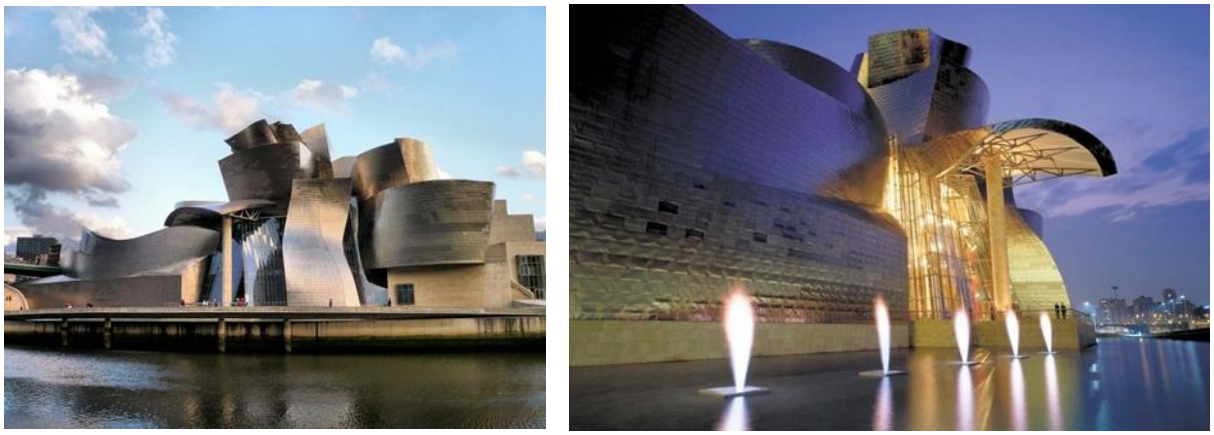

**Fig.16. Transformation, assembly, extension, rotation, transition, bending and communication process for Guggenheim Bilbao Museum [4].**

### 8.2.2. Disney Lounge in America

Walt Disney Concert Hall, located at 111 West Grand Avenue in downtown Los Angeles, California, is the fourth hall of the Los Angeles Music Center designed by Frank Gehry. It opened on October 24, 2003. It is bordered by Hope Street, Grand Avenue and First and Second Streets, with a capacity of 2,265 people [15].

The idea of designing the hall embodies the creative energy and unique artistic spirit of Los Angeles. That is, it's a mixture of traditional art and modern music to come up with this beautiful form, in this building, the architect used transformation, assembly, extension, rotation, transition, bending and communication as in the Fig. 17.


**Fig.17. Transformation, assembly, extension, rotation, transition, bending and communication process for Disney Lounge in America [4].**

## 9. Results:

**The research reached the following results:**

**1.** Technological and technical development led to a transformation in the study of construction morphology.

**2.** The emergence of deconstruction architecture led to the existence of a new architectural thought based on cracking the traditional design constants and benefiting from the analysis of masses to its main elements and then the emergence of different architectural forms from the past.

**3.** Morphological creativity is an intellectual approach aimed at achieving new aesthetic forms that break the structural base of buildings.

**4.** The use of morphological construction analysis techniques for the projects of Zaha Hadid and Frank Gehry, showed that these buildings broke all the boundaries of the structural base and searched for deeper objects in the architectural mass of these buildings.

## 10.Conclusions:

Because of the rapid technological development and computer science, there has been a diversity of building design ideas. It is easy to go towards freedom in building designs. There has become a major architectural shift that emphasizes a new relationship between the architect and modern thought as well as technology.

As a result, the acquisition of changing behavior in architecture so that the surfaces have become more complex and flexibility. In this research, we call for the dismantling of the facilities to parts and deviation from the traditional and re -consider relations between the building, whether it is human or urban. The change in engineering relations in an abnormal and opposite way of traditional construction. This gives the building a distinction and strength, which is the main target of the research that is to make the best use of the new movement for a free architecture breaks the mandatory reality and to prove that building is not just a beam and column covered by traditional façade.

That can be compared to bones covered by skin as said by the great Ludwig (Mies Van der Rohe). However, it became a free building, curvy and wavy similar to nerves and muscles and this is the new movement. Then studying the shape concept development in architecture, morphology and analyzing some supportive projects for that modern movement.

## 11.Recommendations:

1- Architects should use technical development as well as the method of morphological creativity in their architectural designs in order to break all the structural rules of the traditional buildings. Thus, turn the building from bones and skin to nerves and muscles.

2- Create new architectural formations that depend on freedom and disintegration away from traditional design constants.

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