

The Effect of Parametric Modeling in the Design of glass blocks For architecture

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Summary

In the beginning, the use of computer programs was limited to drawing the idea that was designed by the designer (sketch) before, and then to the digital design to show it. But with the development of the impact of digital techniques and the appearance of parametric design and the term- algorithms have affected the design process itself, now most of the architects and internal- designers are using computer programs to develop ideas and not only draw, but the work of their own prototypes, and these programs can connect between several different types of information that provides the program to be forms streamlines.

As we know, the characteristic of the parametric model is not the output but the need to build and maintain the relationships associated with the model. Some researchers develop this approach, such as creating a continuous interactive process of design instead of developing the basic product. All this led to Ideas Generate ideas and new patterns of designs that never existed before, such as Digital design, Folding, Parametric, and Topology.

There are many computer programs that have been used to control design, development and modification to obtain multiple results and to obtain unexpected and unpredictable results such as 3D Max and 3D Rhinoceros plug in Grasshopper.

It is possible to rely on the digital and Parametric design in the modern architectural design through which the design of the architectural units, partitions and glass partitions can be drawn from the stage of the first sketch until the execution and the work of the first model and then the final product whether the final product is a unit or a glass partition or a glass separator full of The tiles are not typical but can be moved and calculated method of installation and theoretical experiment and ensure the validity of their implementation in practice on the final glass product.

Modeling of parametric geometry is a process and advanced science in architectural design, a field in which algorithms is taught in complex geometry calculations on the computer and everything related to it. **So the problem of research is determined in the following:**

Research problem:

The problem of the research is to answer the following question: Does the use of the parametric system affect the generation of ideas and design in the field of interior design and design of glass partitions and partitions and how to use it as a new tool to produce many different ideas and alternatives?

Search Goal:

- The research aims to study the parametric design and how it affects the generation of ideas in the field of interior design and design of glass partitions and glass separations.
- Demonstrating the effect of parametric modeling and algorithm supported by digital design on the computer on some modern architectural techniques such as aerodynamic architecture.

Research importance:

- The importance of research is due to the need to make a spot on and study the tools of digital- technologies, because they have a great impact on the design process of the solutions, and it offered by a variety of sophisticated and ability to choose the best.

Keywords: Parametric design - Digital design – algorithms

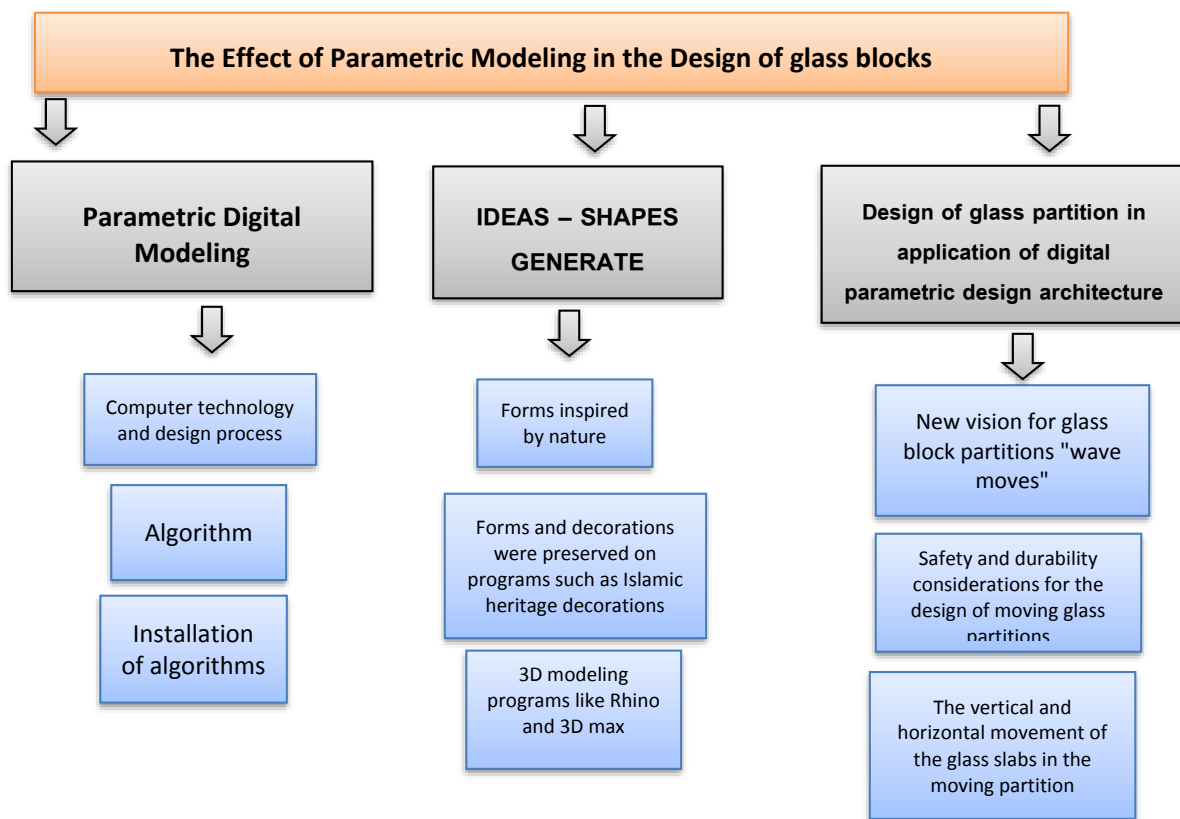


Figure (1) The Effect of Parametric Modeling in the Design

Technological development and its impact on parametric design:

This development is mainly due to the application of the applied digital approach, which enables the integration of arithmetic operations such as parametric into the essence of the architectural design process. We also attend the development of structures closely related to this issue and continuity: the transfer of digital data in "design to manufacturing" and to tools of building elements, but the entire construction process, lies in the transition from drawing a sheet to a "model" structure of the desired shape.

Parametric Digital Modeling:

As we know, the characteristic of the parametric model is not the output but the need to build and maintain the relationships associated with the model. Some researchers develop this approach as creating a continuous interactive process of design rather than developing the basic product. As a result of this subject is that the result of the process of modeling arithmetic is not only a form or a model but provides the possibility of a large (or infinite) of design solutions. Differences in output can be achieved through information changes included in the model's schematic structure.

Computer technology and design process as a way of working Architectural design based on parametric design:

The use of the computer was limited initially to the preparation of engineering drawings and storage of information and then reset them again when needed, and then developed this role to help in the design process itself, and the use of computer capabilities in programming, which depends on the method of solving the problem through Algorithm, Of the mathematical and logical steps that are needed to solve a problem.

The advantages of algorithms: The ability to describe the steps of the solution clearly and specifically, and not relying on a specific method of treatment, and use to solve all similar problems, and easy to understand and understand the steps to solve the problem.

Advantages of algorithms: There are three structures to build programs and write algorithms and idea, any program or algorithm consists of the three structures:

- **Sequence:** where the algorithm is a set of serial operations.
- **Selection:** In some problems cannot be solved in a simple sequence of operations, and may need to test some conditions and an endoscopy of the test result if it is true follow a path containing sequential instructions, and if the wrong track follows another, this method is called a decision or choose the best optimization.
- **Repetition:** When solving some problems, you have to re-sequence the same steps a number of times.

Sources of inspiration for shapes and digital designs:

- A) Forms inspired by nature such as living organisms, plants, etc.
- B - Forms and decorations have been saved on programs such as Islamic ornaments.
- C - Forms inspired by the models that can be produced by digital programs, especially 3D programs such as 3DMAX, Solid Works and Rhino Scrip.

Generate ideas - shapes: (IDEAS - SHAPES GENERATE):

An important stage in the design process was the development of ideas in the field of interior design and architectural design, and IT software helped facilitate the design and configuration of the designer, when using computer programs such as CAD / CAM, CATIA enables the designer to get out of familiar stereotypes, namely, the cylinder, the pyramid and the cube. After using the computer program

Figure (1) illustrates some of the atypical geometric shapes that can be implemented by digital modeling by computer

Soft Ware generation:

There are many computer programs that have been used to control design, develop and modify it for multiple results.

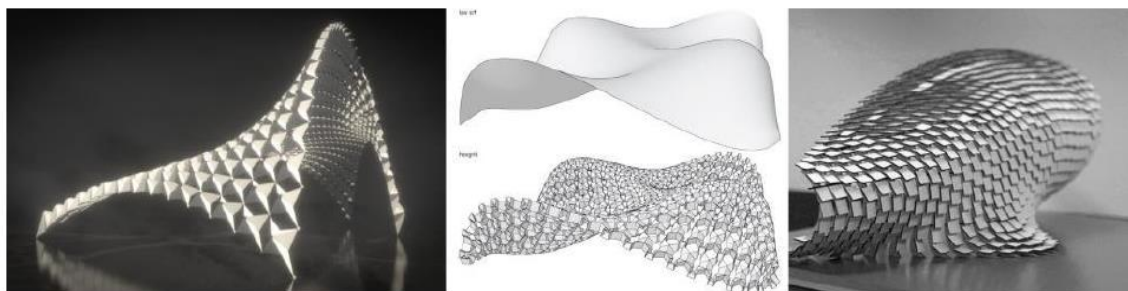


Figure (2) shows the generation of ideas by 3D Rhinoceros plug in Grasshopper

The importance of parametric design in the design of separations and partitions:

- 1 - The ideas and designs can be derived from both nature or geometric shapes with an infinite number of designs and ideas.
- 2 - These ideas that are affected by the parametric design in the design of the joints fit all architectural models, both modern and classic.
- 3 - There is no idea rejected because of the impossibility of implementation on the ground or because of the inability to imagine or the implementation of the model of its.

New vision for glass block partitions "wave moves":

The design of this model design is based on the use of the computer, which can do more than a final design solution using algorithms and parametric modeling principles, but in this design the "Islamic mafruk element" was used as a form of the slabs used to make the glass separator. And took more of the method of installation and shape of the internal separator at the end, and the element "Almfruk" consists in this design by the overlap of 4 rectangular blocks with a square brick in the middle of one unit of the integrated with the repetition of the units to form later with the movement.

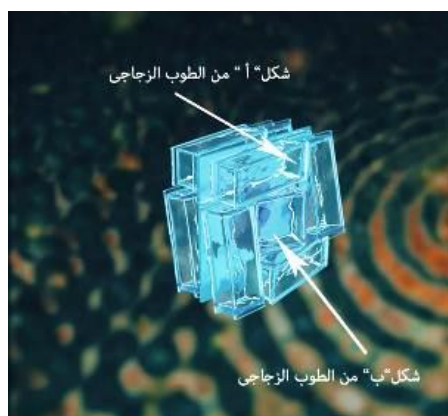


Figure (14) shows the image of the assembled glass unit and the types of used blocks



Figure (15) shows a three-dimensional digital image shown
The glass separator and shows the rhythmic motion wave form

The unit consists of:

Glass panels – Multi movement motors moving horizontally and vertically - Transparent electronic control - Reflective metal hail or tempered Double glass Securite for large pressure

Glass separator made of glass brick: idea (1):

It is clear in the design idea of this fixed interval that the bricks are moving at a certain time directed by the sensor when the person passes by the separator moving bricks and produces the rhythmic motion wave. This separates the hall or office into two pieces in one way without changing or modifying the shape of the place the office falls under a closed office type.

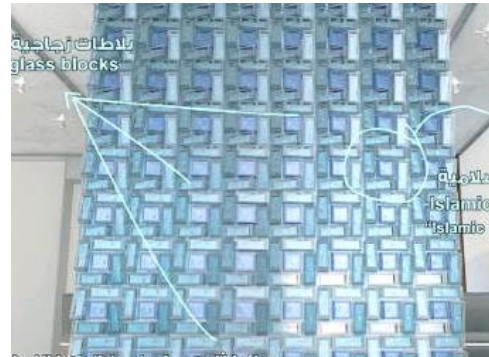


Figure (19) show the frontal perspective of the separator made of glass bricks executed in digital way

Results:

- 1- Digital design supported by the computer designed to free from the constraints of traditional drawing tools, which enabled the designer to innovate and the latest in the ideas and designs that are characterized by dynamism and flow, especially in the interior design.
- 2- Computer programs that work according to algorithm system and architectural and architectural modeling. It helps to produce many different solutions in the field of interior design, design of partitions and partitions in the field of architectural glass in general and provide the tools of choosing the best with study of the environment surrounding the building and the type of interior and exterior model used.
- 3 - There has been a huge development in the field of digital technologies and software for architecture and interior design, which contributed to the enrichment of architectural thought, new design trends emerged as a result of the integration of architecture with technology, including the architecture of aerodynamics and topology.
- 4 - The practical application by digital design in the field of design of glass partitions and glass separators and reached a good result and new ideas and more dynamic of the existing forms.

Recommendations:

1. The research recommends completion of the scientific study method as a practical study to enrich and diversify the study limitation of digital design methods and the design of the field in the field of interior design and modern flow architecture.
2. It is recommended to use the field of theoretical study as an applied methodology to develop and raise the efficiency of Egyptian industries and contribute to increase the thought and awareness of designers, glass specialists and architects.
3. It is recommended for researchers in the field of glass to complete the study in practice to contribute to the emergence of new forms and methods of production to enrich the aesthetic value of artistic use in architectural, technical and industrial.

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