



“ Design systems of glass sculpture for interior architecture between (innovation and application) in relation to the effective performance of untraditional glass mold”

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INTRODUCTION:

With prosperity and the uniqueness of the concept of modern architecture and a link of modern culture concepts with the achievement of identity of contemporary society; the requirements of co-existence between the place and human increased in confirming of place identity or its style. Glass sculpture has appeared as one of the most important artistic fields that can meet those requirements.

With the diversity and the different concepts of internal architecture a lot of variables and constants that have had a prominent function in the diversity of design systems of glass sculpture for interior architecture. The study of these systems in relation to the different methods of application and production methods (traditional and non-stereotypical) has an important role in order to reach a situation of scientific and artistic basics for the formation of glass sculpture as elements within systems is difficult to imagine implementation, and it considered a distant dream for glass designer. These elements are implemented by jumping on the concept of the formation of traditional glass mold in order to reach to confirm the concepts of creativity through different design systems.

So the research problem appeared in:

•The need to emphasize the relationship between design systems of glass sculpture for interior architecture and effectiveness of performance of the untraditional glass mold.

The research aims to:

•Determine the relationship between innovation of architectural glass sculpture design systems and application methods through untraditional glass mold.

The importance of research is:

• Prepare a compared scientific study for design and application systems outside the framework of the concept of traditional glass mold to confirm the creative status for glass sculpture designers in interior architecture.

Hypothesis of search:

•That can be accessed to determine the relationship between innovation and application for systems of design architectural glass sculpture by stereotyping new methods and mechanisms for the formation of the molten glass inside the untraditional mold.

Search limits:

Finding a relationship between glass sculpture design systems (3 D) (producing from molten glass) for Interior Architecture and application methods outside the framework of the concept of traditional glass mold forming.

Research Methodology:

•The research follows analytical method.

Key wards:

Design systems - Glass sculpture - Glass mold.



The paper deals with a range of theoretical and analytical studies which were represented in some of the themes that are trying to answer the research questions to achieve the hypothesis as follows:

-The first axis: Basic concepts in sculptured formation:

What is sculpture?

It can be said that it is one of the most fine arts known to man survival and sustainability through the ages. It was as a principal means of expression of human interest to show the beauty value in his usability tools and then became one of the key elements in the expression of aesthetic and symbolic value as well as religious beliefs. Sculpture has made - along with the architecture - the main body of religious & memorial art. Today, in spite of the continuous development in all areas, sculpture still leading the way for the expression of various events, and the commemoration of historic events and commemorate the personalities and public - private events.

The traditional - modern and contemporary art of sculpture:

Before the twentieth century, the traditional Sculpture had main characteristics distinguish it: three-dimensional art, representative art, express in fixed solid materials, the formation techniques (Removal by drilling directly into solid materials - Addition through the use of clay or plaster or wax).

Modern and contemporary sculpture shift towards total abstraction. It is characterizing the potential of variety in the formation may depend on its ability to assemble from different components and raw materials, or pasting different parts together. It may be due by displaying a light in the form of themes and three-dimensional elements, or be constructed in various old or modern methods. It can be classified the most important trends in contemporary sculpture to:

- Dynamic sculpture: concerning of living forms in the configuration by simulating the natural forces affecting the live elements.
- Expressionist sculpture: interested in express the emotional states in organic and geometric configurations.
- Kinetic Sculpture: It is associated with moving sculptural configurations automatically or by air currents to give constituted variably associated with the movement system.
- Synthetic Sculpture: Using elements of fact or industry waste to re-arrange them in new configurations.
- Subtractive (Reductive) Sculpture: a method of artistic expression abstracting things to the basic essence.
- After reductive: the use of simple materials has aesthetic character in sculpture.
- Environmental sculpture: configuration depends on the dialogue between art, nature, technology and the collective arts, to raise the collective visual sensation, using materials compatible with environment.
- Conceptual sculpture: It reflects the concept or idea in the primacy of the aesthetic expression, with an emphasis on modern technological contact with reality.

Sculpture design elements:

- Mass: refers to the overall sculptural work and sub-sections that are configuring sculpture.
- Space: refers to the air surrounding sculptural mass, which reacts with the sculpture in variety of ways, First, it represents a sculptural work goes beyond the limits and then to become part of it, including the empty spaces and vents it contains.



- Surfaces: the item that results in a number of different visual effects according to the classification of such surfaces in terms of being: convex or concave or flat or r colored or non-colored.
- Color: is an important element influencing -positive or negative- the design of sculpture.

Principles of Sculptural Design:

- Orientation: Aiming to create a feeling of harmony (or disharmony) in sculptural work, or between its various parts, or between sculpture and viewer, or between the sculpture and the environment surrounding it.
- Proportion: It specifies volumetric relation between sculpture and its environment, and between parts of sculptural work.
- Scale: It refers to the need to formulate a sculptural work in harmony with the surrounding elements metrics.
- Articulation: It describes how the elements of the sculpture are grouped together.
- Balance: figurative sculpture includes the stability of the body of the construction, and the sense of kinetic and static balance.

The second axis: Glass sculpture and the basics of its formation:

Glass is one of the important raw materials that go into formation of sculpture, as it contains the aesthetics in shape and ability to survive and resilience.. in a special artistic expression that respects the raw material and shows the most important characteristics represented in the transparency and harmony with the light in addition to the rich color, which allows new and innovative formulations, as formation technique is one of the important pillars of influencing the creative approaches to glass sculpture formation.

Beginnings of glass sculpture were to the use of natural rock glass (obsidian glass) in the form of small sculptures found in ancient Egypt and Mesopotamia. With the discovery of many glass techniques, a sculpture glass form evolved; and a small sculptures glass found in the form of amulets and small Glassware formed for the purposes of aesthetic and functional different by using simple tools for forming. Glass molds appeared to help in the preparation of forms, also used the casting technique of molten glass within the mold. In the middle of the first century AD during the Roman era was the glass industry discovered by blowing (Blowing glass), that affecting the spread of the glass industry in a variety of fields.

Sculpture glass is considered one of the important associated with the internal architecture; it enters in the composition of many of the architectural elements and its accessories, in addition to the use of the objectives of aesthetic. Different techniques to form a sculptural glass are creative entrances affecting the sculptural form design; and that highlights the relationship between design and production through innovative system trying to search for integration in the artistic expression of the composition and sculptured to achieve his aesthetic and usability. The formation of a glass sculpture important themes that can be classified by the glass sculpture techniques, and it can be classified according to the glass sculpture composition techniques to:

- The formation of molten glass:** (blowing - casting - pressing - casting and pressing.)
- Re-thermoforming of the glass:** (thermal formation torchlight - re-thermoforming of the glass in the closed furnaces).
- The formation of the glass without the use of heat:** (formation collects models of glass - forming collects glass slides - forming collects glass granules - removal forming).



This research deals with sculptural glass formed from molten glass; focusing on the formation processes using blowing and casting methods by molds. A glass mold is the main component of the Shape of work, by identifying the periphery of the form. There are many forces acting on the molten glass movement (strong coercive in production blow molding or pressing, gravity in production casting) to come into contact with the surface of the mold to form glass sculpture. Untraditional glass mold is one of important ways in design and production glass sculpture. The innovation of glass sculpture imposes to take a variety of technical methods that open wide areas in the design of the glass sculpture.

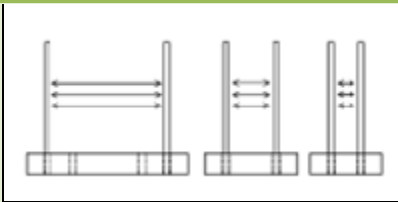
-The third axis: Analytical studies:

This axis is linked with an array of analytical studies aimed to show the effect of glass production techniques using untraditional molds on design systems of glass sculpture for interior architecture. The study done on two fields:

-First: Blow molding:

The formation of glass blowing for sculpture produces small individual pieces (not exceeding 80 to 100 cm). Large sculpture by this technique need to use the design system based on the combined formations. The following analysis of the formation to some mechanisms of glass sculpture using untraditional molds, and how to adapt them to create different directions in design.

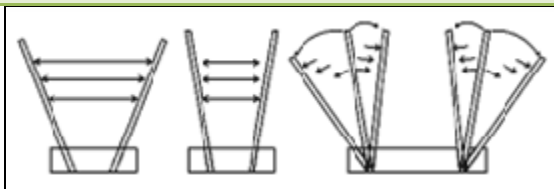
1- Glass sculpture using untraditional mold by forming within framework of metal rods (fixed – changing): This way characterized by out of the ordinary in the design and composition of sculpture by blowing formation of molten glass within the range of metal or wooden rods installed inside the holes in base mold, with the possibility of modifying the distances between the rods to control the structural shape, This method is characterized by easy access to a variety of shapes.



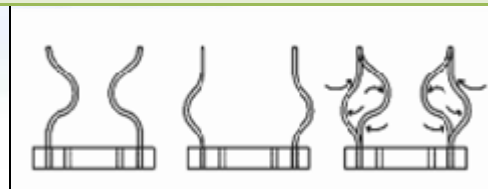
Change the dimensions to change the sizes and spaces dimensional sculptural work, as can control the form and texture by controlling the distances between these rods.



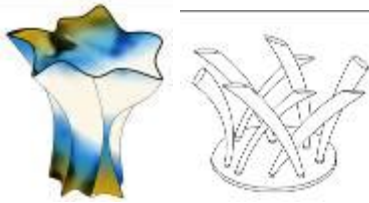
The use of wood or metal to make specific units of glass sculpture by using untraditional mold.



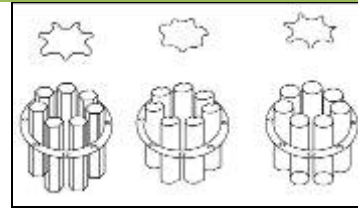
Change general shape of sculpture by allowing the movement of the rods.



Change general shape of sculpture by changing rods shape vertically (bending), resulting groups of varying shapes.



It can be put system to blow on irregular rods in diameter or in the movement, and thus produce different sculptured systems.



Change the shape of Sculpture by changing wood and metal rods sections; from rotational to polygonal to irregular shapes

= Considerations:

- The movements of the rods are given diverse formation and texture.
- Method is characterized by simply forming.
- Changing the glass shape depending on design requirements and rods section.
- Sculpture can be designed with textures by using special metal rods.
- Sculpture associated production method, shape and size of the rods and distances between them.

2- Glass sculpture using metal wire mold: Metal wire used to approximate the shape of glass sculpture, taking into account the harmony in color and volume between the glass shape and metal wire mold. Space between the metal wires effect on the overall sculptural form.



Taking into account the secondary functions of the formation of the metal in sculptural glass, as a supportive body construction of the structure to glass sculpture.

Metal formation has main function, namely the establishment of the sculptural glass shape. Taking into account structural and technical direction and relative size and mass of metal forming with that of glass. Mold can leave or remain with glass after formation.



Design work of sculptural glass by assembling metal units.



Design units system with a single nature to be formed within the sculptural shape of metal wire. The metal can be used in specific parts of the configuration to be complemented by structural glass system for the final shape.

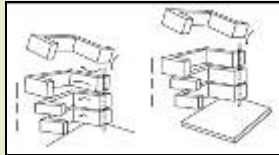
Considerations:

- Take into account the structural and technical field of the relationship juxtaposition between glass and metal.
- Method is traditional and old but they are simple and quick ways to design a sculptural model of glass.
- The form can be from glass with/without metal structure.

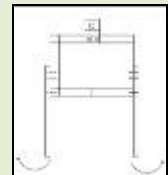
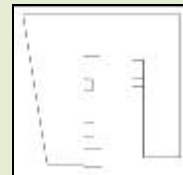
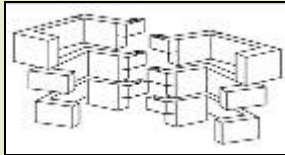


- It can confirm the contrast between the silence of metal, fluency transparent glass and movement of colored glass with numerical accumulation of the metal wire.
- Through this system can create a dialogue to form a relationship between the overall movements of the metal lines in relation to the formation of glass sculpture.

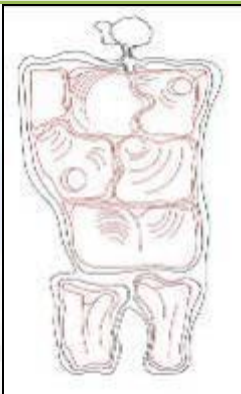
3- Glass sculpture made in wood molds of superposed units: These molds are superposing units installed on the vertical axis so that they are influential in the formation of glass sculpture, and can move the units to produce variable forms.



Design sculpture in molds from the units subjected to movement and elongation.



Forming shape through using mold from wood units to change design of sculptural work.



Design glass sculpture with a single or synthesis constructive, using multiple systems for assembly in accordance with design and production requirements.

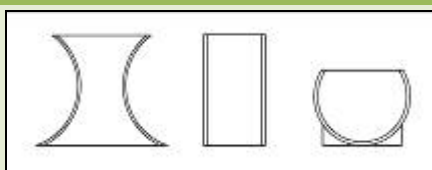


Forming a sculptural design based on the use of untraditional mold from wooden sectors, for variations in the form of glass sculpture.

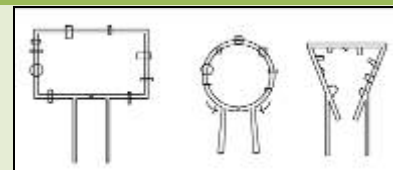
Considerations:

- This system can be achieved richness of sculptural works design by changing the dimensions of the mold parts.
- A system based on design shapes with the nature of the horizontal or vertical extension.
- Can Sculpture can be designed with a single or synthesis construction of the same nature of the design or compilation of different units to create a sculpture with a private nature.

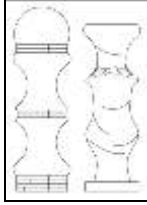
4- Glass sculpture using metal plates with variable texture: The mold has slabs of wire or metal sheet taking geometric shape and consisting of several parts, in addition to a lot of sizes causes texture in glass.



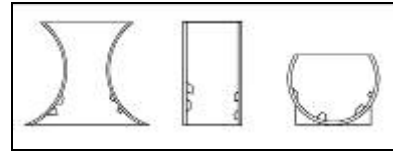
Unity can change on the vertical elevation, so that the mold and sculpture varies.



Unity can change on the horizontal plane, so that the mold and sculpture varies.



The unit can be configured from a single glass sculpture or be combined from units of glass to create an integrated sculptural work.

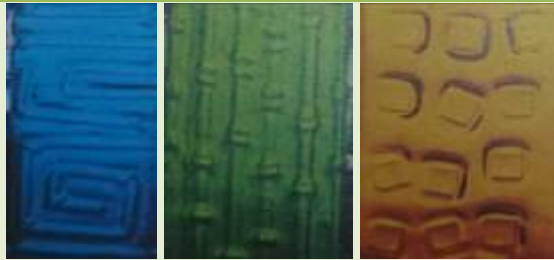


Texture in the body can change in horizontal and vertical levels affecting on shape.

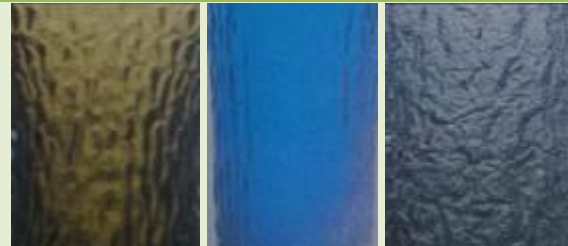
Considerations:

- System shape of the unit changed horizontal and vertical for design different sets of sculptural formations.
- Contrasting textures on the horizontal and vertical levels.
- There is an infinite variety of shape and size, type and texture can be designed.
- The harmony between different textures can be configured as design requirement.

5- Glass sculpture in wooden molds using different types of textures: Wooden molds are considered important for the implementation of a glass sculpture by blowing; they have the properties to make texture in glass from natural or manufactured texture inside the mold.



Implementation texture using small wooden pieces mounted on the inner surface of the mold. Texture can be implemented using metal screws and metal wires.



The formation of textures using the bark of the timber. And taken into account in sculptural form design system takes geometric and vertical shapes (avoid undercut).

Considerations:

- Texture and sculptural formation is linked to mold.
- There is the ultimate diversity of size, shape and type of texture output from wooden mold
- Increasing the glass sculpture enrich the texture values using texture of bark of the wood to highlight the relief sculpture (bas-relief, haut-relief, sunken-relief).

- Second: Casting:

The formation of glass sculpture by casting of molten is an important road for the implementation of glass sculpture, where this technology is characterized by its suitability for products of an artistic nature, and it depends on configuration small and large designs. Large masses bear structurally as a result of large thickness, and in spite of the difficulty of cooling the large thickness; however, due to modern technology possible to overcome the problem of annealing and stress in glass. The thickness of the glass and transparency one of the important elements to show the aesthetic effect of glass sculptures.



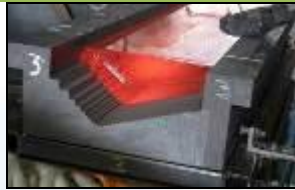
The design of a glass sculpture by casting from glass molten



Used tools and equipment assistance to facilitate casting large pieces inside the oven itself and that for technological and structural considerations while loading the molten glass.



Formation in sand molds is configured for a variety of glass sculpture. It produces configuration mass (without small relief). The refractory mold (silica – plaster) is making a variety of sculpture with relief.



For design functional glass sculpture like seats, casting method able to meet the construction requirements of the seat.



Sculptural Glass can be single or compound design of molten glass; it can also be a hollow formation, in which case the shape design takes into account the thickness of the glass so that it is enough to allow the molten glass to enter all the details of mold.

Considerations:

- It is more freedom of the methods and fluency in the free expression of the artist without being bound by technical considerations and the requirements of the glass.
- Facilitate the work of the blanks in sculptured work structure.
- System design in glass sculpture by casting of molten mainly depends on the confirmation of harmony color and intensity of color in mass and composition.
- Forming in sand molds associated with design based on mass configuration.
- The tonal of transparent glass sculpture vary depending on the thickness.
- Sculptural Glass can be a single or a composite of molten glass design; it can also be a hollow profile.
- This system is characterized by the formation of large-sized units are grouped and thick so that it can resist the environmental conditions and construction.
- This system is unique in functional glass sculpture design, like seats and facades wall and glass architectural elements, where casting method able to meet the construction requirements for the design and implementation functional sculpture.

-The Fourth axis: Requirements of glass sculpture design for interior architecture in the context of achieving creative values::

Sculpture associated generally and glass sculpture in particular to the system of creative process; the process concerned with the achievement of relative integration of a set of subjective and objective factors, which is leading to a new and original design in sculptural form, by the composition of new relationships to achieve functional and aesthetic benefit to the individual and society.



Innovation may come in glass sculpture from artistic basis; based on self-artist or designer, or the embodiment of the constituent elements of the work of heritage or of nature, with the need to achieve a set of considerations that control creative thought in configuration, and includes: considerations (Aesthetic - Functional - Environmental - Technological). Glass sculpture is one of the important areas which clearly shows where the creative process effect. Diversity of design sculpture and its employed in the internal architecture opens the door wide to embrace the ideas and trends of innovative variety in the context of mating between design considerations and production requirements... from here glass sculpture was the largest share in find trilogy about: Design - Production - Innovation.

It can be classified innovation in glass sculpture for interior architecture into three directions: (Artistic innovation: depends on the development of new artistic formulations by organizing of the configuration within the architectural, that respects the most important aesthetic and expression characteristics of glass - Technical innovation: where the primary source of artistic expression is the capability of the raw material and methods of formation to be the prime mover in the adoption of sculptural system, where consistent design with the technical requirements - Functional innovation: It is linked to the achievement of sculpture to other functions than beauty; it achieves advertising or informational function or achieve the functions of usability as one of the architectural elements or accessories).

A search has been reached following results:

Put classification for most important of forming glass sculpture techniques. A study of some of the methods and systems for sculpture glass design for interior architecture in relation to formation techniques in untraditional glass molds by the formation from molten glass by blowing and casting. Conclusion of a set of considerations for glass sculpture design linked to the production process requirements, in order to confirm the relationship between the innovation system in the design and various method applications for sculpture glass formed in untraditional glass molds. Develop a set of innovative solutions that include the standardization of new methods in the formation mechanisms in untraditional glass mold, allowing the development of new directions for the design of the glass sculpture linked to the techniques under study. Develop a compared model to glass sculpture design systems for internal architecture; so that shows the potential of each system within the framework of design and technology.

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- 3) **Marianne Stern and Birgit Schlick-Nolte:** Early Glass of The Ancient World [Book]. - New York : Hatje Cantz Publishers, 1997.
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