

# Utilization of The Diversity of the Islamic Arts to Create 3Dimensional Models That Serve the Field of Glass Design

## Second axis; heritage “Identity & belonging”

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### Abstract:

Islamic arts are characterized by great diversity and richness, which made it a source for creativity and for designers to utilize it and start process of creativity and design. There is no doubt that contemporary changes and technological developments that we are witnessing today are much faster from being absorbed and applied in computer modeling. 3D models with simple and available materials such as wooden sticks to create models that serve the architectural, technical and industrial glass design.

#### The research problem was:

-The need for a systematic program for the work of three-dimensional models (wooden sticks) with graded complexity to be utilized in the design of glass using the engineering networks of Islamic art.

Therefore, the objectives of the research are:

-Access to a program that helps designers to create 3D models that serve different areas of glass design.

- Enriching and diversifying designs through the use of engineering networks for Islamic art.

The importance of research is determined by:

-Developing the creative ability of designers by activating the characteristics of Islamic art to create three-dimensional models.

-Preserving the heritage by activating it in modern models for different areas of glass design (artistic-architectural-industrial).

The research concluded with some of the relevant conclusions and recommendations:

To conclude that; the emphasis on the Islamic identity using elements of Islamic art as a source of design led to the diversity and richness of different designs.

The designer acquired the planning, design and implementation skills of the model from the initial ideas through the executive drawings to the final product. The research recommended directing the designers to take care of the Islamic civilization and its historical origins and to use them in asserting the Islamic identity in different fields of design, especially glass design.

### Key words:

3D models- design-glass.

### Introduction:

Islamic art is characterized by great diversity and richness, which made it a source to all creators and designers to take from it and get off through the world of creation and design. There is no doubt that contemporary changes and technological progress that we witness today are faster than what we can absorb and apply in the field of computer modeling, we should preserve our

identity and prepare the art student to make 3D models with simple and available materials that serve the field of architectural, artistic and industrial glass design.

The **research problem** is;

The need for a modeling design system to do 3D models that are gradually complicated to benefit from it in designing glass using the geometrical nets of Islamic art.

That's why **the research goals** are;

- Reaching a modeling design system that helps designers to make 3D models that serve the various fields of glass design.
- Enriching and diverse designs by using the geometrical nets of Islamic art.

**The research importance** is;

- Develop the creative abilities in designers by activating the properties of Islamic art to make 3D models.
- Revive the heritage by activating it in newly prepared models in the different fields of glass design (architectural, artistic and industrial).

the research concentrates on the geometrical Islamic nets to make 3D wooden models that help student and designer in clarifying, choosing and enriching the primary thought of the design which produce design alternatives that are clear to the mind of the student or the designer to ease the decision of modification and production.

**The geometric Islamic nets;**

Artists of the Islamic ages developed Islamic geometrical decorative patterns instead of personalization as repeating of the use of collections of squares and circles was dominant at most of the geometrical designs in Islamic art, which could interfere together like the art of **Arabesque**, and they included various shapes like the art of **Mosaic**, the degree of complication and diversity of the used patterns graded from stars and simple rectangles in the third century A.H. to a diverse group of 6-13 sided shapes in the 7<sup>th</sup> century A.H. then stars with 14-16 sides in the 10<sup>th</sup> century A.H., the geometrical decorations were used at many forms in Islamic art and architecture that included the Persian Jira and mini-carpets (clem), the Moroccan glazing brick, necklaces, the holed gypsum windows, pottery, leather, colored glass, wooden and metal jewelry.

**Caring about surface decoration to fill the voids;**

The Muslim artist deeply cared about decorating surfaces, not leaving a void without decoration, when he was designing a vessel or a masterpiece –even in the shape of an animal or a bird- he would have filled its surface with decorations to take away its nature to look as a moral, while adding incomparable magic and grace. The Muslim artist in decorating his artistic products depended on elements of calligraphy, lines, botany, shapes of humans and animals using his instinct. He reached balance and grace at those works, he had a clear tendency towards covering areas where we find it full with connected ornaments that cover all the area without boredom, and he drew on the frame of the picture or the artistic work then he broke the frame and got out to a new void to break the stiffness and reduce the regularity and arrangement. He filled the space with equal trimmings or moved from small to big or filled the back with his lines which resulted in contrast at the level of the surface or contrast between the light and the shadow until it was said that the Muslim artist runs or panics from the space.

Geometrical patterns plays an important role in Islamic art as it helps to create beautiful geometrical combinations, if we observe the trimming methodology or the calligraphy or the architecture we find that the artistic work is based on a geometrical unit that represents on its own a shape which is an independent and complete world that is undivided, then this unit is repeated in a mathematical, geometrical system to form another geometrical unit different than the first, and so on till we can fill the whole universe or the horizon. The function of the geometrical line is to locate the areas that form the units and tend to accuracy and minimization as directed to the center as in the star-shaped plates which give the impression of movement.

The designer in the Islamic ages used the simplest geometrical relations which are the straight line, the circle, the square and the triangle in building the Islamic compositions and the most complicated Islamic geometrical systems relying on the mathematical laws, and the trimming is composed using a basic element that is duplicated in the direction of the 2 axes and represents a net that can be obtained by simplification. The shapes (triangle- square- hexagon- circle- pentagon) are the beginning of composing a net system that the geometrical decoration was based on.

Trimming (decoration) is known as a group of lines, dots, geometrical shapes, many plants and animals' drawings and many integrated and cohesive words that eventually give a specific form that is used in decorating churches, mosques, buildings and extra. The science of decoration aims to look in the philosophy of ratio, stripping, mass, space, composition, line and color, and is composed of natural human, botanic, animal and geometrical units that transformed into stripped shapes, and left a space for the imagination, emotions and creativity of the artist, and has origins and rules. One kind of those trimming is (botanic-geometrical) where artists were so creative in using the plants shapes as tree branches, leaves, fruits and flowers in forming a trim for artistic products like buildings and masterpieces, artists transformed all the used elements from their natural look, the use of such trims increased at the 9<sup>th</sup> century A.D. the peak of that use was between the 12<sup>th</sup>-13<sup>th</sup> century A.D. artists used calligraphy trimming (writing) trimming added to calligraphy a look of beauty that pulses with life and magic in addition to being a mean for science and knowledge, and that kind is still evolving, growing and multiplying to the extent of exaggeration in the ways of modifying parts of the combined or singular letters. That modification was considered

a kind of decoration, the types of such decoration alone exceeded 80 types when it reached its perfection at the Abbasid era, and is considered a type of artistic luxury that no nation has reached before, also they started using the geometrical trimming at the Umayyad age, it was successful in a way that didn't happen at any civilization, despite its simplicity out of using the basic geometrical shapes( squares, straight lines, circles and triangles) which had very important and basic role at the Arabian ornateness, and became a foundation for the Islamic decoration forms, and was characterized with its strong impression that appears clearly at the use of the star shaped plates compositions that decorated the artistic products and the building's surfaces. While the illustration ornament uses the living beings as a mean that is used as a unit in the decoration works, ancient artists used it as one of the legendary forms, using living beings as a mean, which is considered a form of paganism, that's why Muslim artists wanted to step away from it to vanish any form of paganism, so that type faded away gradually and was replaced by the wall drawings instead.

**Modeling;**

3D models in space are represented as (x, y, z) and are linked together by geometrical shapes (triangles, lines, and curved surfaces) that can be built manually or computerized or scanned with light, and are used in a wide scale in architectural, artistic and industrial glass designs, there are 3 common ways to execute a model.

**The polygonal models;**

Dots in the space are being linked together with straight lines to form a figure of polygonal and that polygonal net could be used to form a smooth curved shape.

**The Curved models;**

The surface is being formed by curves, those curves are affected by the place of the dots, not necessarily touching the surface, this way is called (NURBS).

**Digital sculpture;**

A relatively new way of modeling, which has become so common in the past few years.

**Models;****What is A Model?**

It is a figured simulation of something which can be identical to the imitated thing or simple, stripped from unnecessary details, maybe as a piece or as the whole, opened or uncombined or transparent.

The model has 3 states, it's either;

- 1- larger than the original.
- 2- Smaller than the original
- 3- Identical.

First and second states are more common in producing models, as reforming the original thing that is a characteristic to them which achieve the educational purpose of the use, and the number of enlarging or shrinking should be shown, there are some clarification of models types;

**Models Types:**

- 1- **Section models;** they care about the internal structure of the thing at the place of the section, which could be vertical or horizontal, it is preferred to be complete, as if we adhere the 2 halves of the section together, it gives us the whole thing and gives the same external form.
- 2- **Cutaway models;** are those models which have an opening for showing the internal content of the thing without making a section inside it.
- 3- **Cross-section models;** are used basically to clarify the features (the external look or the external form of the thing) those models have a constant drawing scale.
- 4- **Model with removable parts;** are used with removable pieces to show the different parts that the thing is formed from and the relation among them.
- 5- **Transparent models;** their outer cover is made of transparent material so the internal contents are to be shown.
- 6- **Sand table;** is a wooden box, its ages are of low altitude and covered with layer of sand and its use is no different than the use of compound models, there is one goal which is trying to relate reality to the student's mind to assist him in realizing a better education with meaning such as realizing the concepts and learning them or explaining part of the phenomena, by configuring the sand, the designer can imitate the various phenomena and represents them.

7- **Diorama**; is a configured scene that is smaller than the environment or the fact that it represents.

Their elements consist from configured scenes made of available materials in the environment like paper, wood, wooden sawdust, glue, etc.... they are all of the low cost, those elements might include polyphonic mini-figures for humans, buildings, animals, trees and plants that might be painted or colored before fixing them at their places and those tools and materials could be sold commercially, their importance rely on the student's participation in their production, so it helps them in developing their talents and creativity and innovate part of their mental abilities such as description, observation, and classification.

This way preparing a model which is considered one of the pedagogical technics, and one of the easiest educational ways of teaching that could achieve a part of the most elegant educational concepts in the mental field.

#### MODELS MATERIALS:

The polyphonic are made for educational purposes from materials the most famous of them are sponge, gypsum, news- papers, paste and wood, those polyphonic could be obtained from the local market or could be manufactured through local production (school) especially if the primitive materials are available and the teacher is willing to do it and have a sense of art.

According to the materials they are made of, polyphonic which are classified as;

- 1- Sponge polyphonic
- 2- News-papers polyphonic
- 3- Gypsum polyphonic
- 4- Wooden polyphonic

1- **Sponge polyphonic**; are considered the most widely spread polyphonic for the ease of their manufacture, low cost, and flexibility in dealing with them.

2- **News-papers polyphonic**; materials required are:

Paper scrapes-flour- wood-glue-pinpoints- wooden sticks-plastic vessel- powder-water- oil paint- various colors- brushes-container- hammer- pliers- pins with different length- marker-ruler.

3- **Gypsum polyphonic**; gypsum is a white, heavy dusty matter that is dried rapidly.

4- **Wooden polyphonic**; are considered one of the most modern spread polyphonic for the ease of making them, low cost and the flexibility in dealing with them, here is a clarification for their importance and advantages:




The importance of utilizing the polyphonic in general and the wooden ones in particular especially in-class teaching, we could say that the importance of utilizing the polyphonic with planning and execution to teach and learn part of the scientific concepts that are emerged from:

- 1- The increase of the scientific knowledge that is resulted from scientific search and discovery, the incapability of the student to realize and follow them by written educational material only.
- 2- The capability of the embodied to relate the reality or the original thing to a part of the private concepts of various sciences generally and design science to build a pyramid of experience for them in a rational sense.
- 3- The embodied could represent the small and mini parts and the huge ones in a way that the student can specify the most related concepts to the availability of those parts at all products.

The advantage of the wooden polyphonic;

- 1- Low cost, easy formation, light and from the local environment of the student.

- 2- It could be dyed with several colors and the colors are stable.
- 3- It could be strengthened (make it hard).
- 4- Serve for a long period time.
- 5- Any student can make a model out of them.
- 6- I especially mention at this research the wooden models with the repeated unit (tooth-pick, flat-stick, and rod) they are glued together with gluten or silicon.
- 7- **Table (1) clarifies the wooden units used in making the models.**

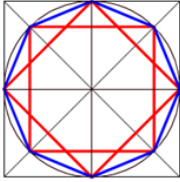



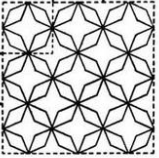




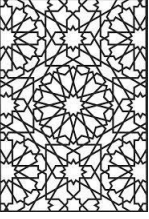








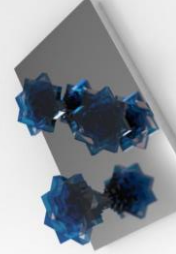
|   |   |   |
|---|---|---|
|  |  |  |
| <b>Rods</b>   | <b>Short rods</b>   | <b>Sticks</b>   |

**Table two (2) clarifies the colored wooden units that help to show the model closer to reality.**

|   |  |   |
|---|--|---|
|  |  |  |
| <b>Wooden units, colored silicon used in adhesive</b>                               |  |   |





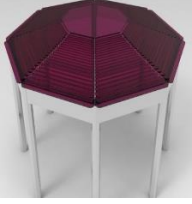

By making simple models out of the wooden units, the research found out the need of the student and the designer to a gradual curriculum to produce the 3D models with a progressive complexity to benefit from in designing the artistic, industrial and architectural glass assisted by the geometrical nets of the Islamic art, and that is done first by Islamic net and specify the ornament unit then building the model on axis Z, then specify the movement and build on axis (X-Y)(shrinking-enlarging -rotating-combining-building) then identify the type and function of the product.

**Table three (3) clarifies a modeling design system that helps the designer to make 3D models that serve the various fields of glass design.**

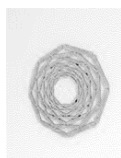


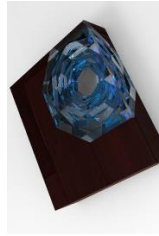
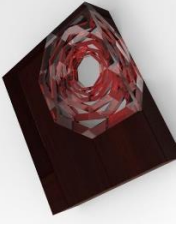
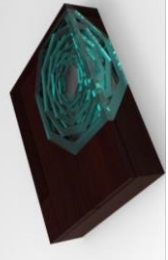



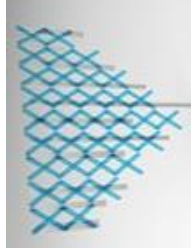

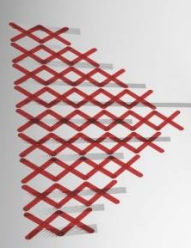
| Islamic Network  | Construction of the wooden unit   | Wooden model  | Glass architectural design  | An alternative chromatic  | An alternative chromatic  |
|--|---|---|---|---|---|
|                                   |    |    |    |  <p><b>Architectural building</b></p> |    |
|  <p>366-367. — OCTOGONES SUR</p> |   |   |   |  <p><b>Square sculpture</b></p>      |   |
| Islamic Network  | Construction of the wooden unit   | Wooden model  | Glass architectural design  | An alternative chromatic  | An alternative chromatic  |
|                                 |  |  |  |  <p><b>Fountain</b></p>             |  |
|                                 |  |  |  |  <p><b>Fountain</b></p>             |  |



**Table three (4) clarifies a program that helps the designer to make 3D models that serve the various fields of glass design.**

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| Islamic Network   | Construction of the wooden unit   | Wooden model  | Glass architectural design  | An alternative chromatic  | An-alternative chromatic  |
|  |  |  |  | <br>Parachute |  |

**Table three (5) clarifies a program that helps the designer to make 3D models that serve the various fields of glass design.**

|   |   |   |   |  |   |
|---|---|---|---|--|---|
| Islamic Network   | Construction of the wooden unit   | Wooden model  | Design of industrial glass  | An alternative chromatic   | An alternative chromatic  |
|  |  | <br>Table  |  |  |  |
| Islamic Network   | Construction of the wooden unit   | Wooden model  | Design of industrial glass  | An alternative chromatic   | An alternative chromatic  |
|  |  | <br>Applik |  |  |  |
| Islamic Network   | Construction of the wooden unit   | Wooden model  | Design of industrial glass  | An alternative chromatic   | An alternative chromatic  |









|   |   |   |   |  |   |
|---|---|---|---|--|---|
|  |  | <br>Office lighting unit |  |  |  |
|---|---|---|---|--|---|

Table three (6) clarifies a program that helps the designer to make 3D models that serve the various fields of glass design.

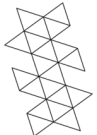





| Islamic Network   | Construction of the wooden unit   | Wooden model  | Design of industrial glass   | An alternative chromatic  | An alternative chromatic   |
|---|---|---|--|---|--|
|  |  |  | <br>Lighting unit |  |  |

Table three (7) clarifies a program that helps the designer to make 3D models that serve the various fields of glass design.

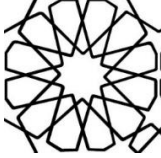


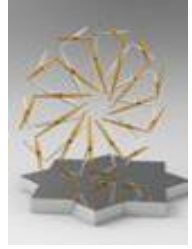


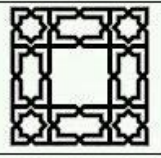





| Islamic Network   | Construction of the wooden unit   | Wooden model  | Artistic glass design  | An alternative chromatic  | An alternative chromatic  |
|---|---|---|--|---|---|
|  |  | <br>Aesthetic unit     |  |  |  |
| Islamic Network   | Construction of the wooden unit   | Wooden model  | Artistic glass design  | An alternative chromatic  | An alternative chromatic  |
|  |  | <br>Costume (Bracelet) |   |  |  |

Table three (8) clarifies a program that helps the designer to make 3D models that serve the various fields of glass design.





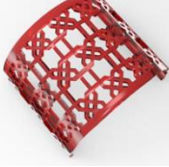





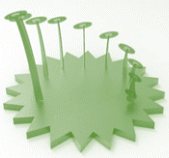

| Islamic Network   | Construction of the wooden unit   | Wooden model  | Artistic glass design   | An alternative chromatic  | An alternative chromatic  |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
|  |  |  |  |  |  |

Table three (9) clarifies a program that helps the designer to make 3D models that serve the various fields of glass design.





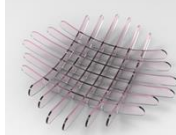
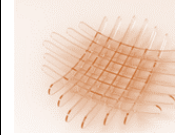
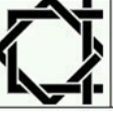


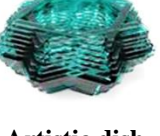

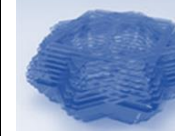
| Islamic Network   | Construction of the wooden unit   | Wooden model  | Artistic glass design  | An-alternative chromatic   | An-alternative chromatic  |
|---|---|---|--|--|---|
|  |  |  |                   |  |  |
|  |  |  | <br>Artistic dish |  |  |

Table three (10) clarifies a program that helps the designer to make 3D models that serve the various fields of glass design.

### Results:

- Confirming the identity of Islamic region using elements of the Islamic heritage as a source of the design led to diversity and enrichment in the artistic, industrial and architectural designs executed by the glass material.
- Realizing that we should smooth to the student the skill of the 3D formation by the thought and ways of layering of the design and the execution of the product starting with the primitive ideas to the executive drawings to the final product.
- Realizing a curriculum to do the 3 dimensional models that has progressive complexity to benefit from in designing glass using the geometrical nets of the Islamic art.

## Recommendations;

- The research recommended directing the students to be interested in human civilizations and their historical origins to benefit from them in assuring the Arabic and Islamic identity at the various design fields.
- The research also recommended caring about the changes in modern technics and their effects on traditional arts and architecture.

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