

## The Artistic and technical effect of design self-installed glass accessories for interior architecture

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### **Introduction:**

Glass is one of the key materials of modern architecture because of its unique properties to achieve added values by which it can satisfy the requirements of functional values of internal and external architecture by utilization of diversity of physical and chemical properties. In addition, it can achieve many aesthetic contexts exclusively from many conventional materials as design requirements to satisfy the required function.

**Problem of the research:** Modern architecture system lacks aesthetic and functional diversity in the systems of installation of glass accessories.

**Objective of the Research:** To study the added values of art and technical and artistic effect of design and production of "self-assembled" glass accessories units.

Importance of the research: To enrich the internal architecture system with value added alternatives to the systems of installation and assembly of glass accessories for internal architecture.

Hypothesis of the research: (self-assembled) units of glass accessories can be designed and finished to be of variable pattern from the conventional patterns with technical and artistic effect that enriches the internal architecture system.

Limitations of the research: Study of the technical and artistic effect of "self-assembled" glass accessories by means of plunging for interior architecture.

Methodology of the research: (Analytical- experimental)

### **The study depended on the following points:**

- Description and classification of glass accessories
- Analytical study of some conventional patterns of installation of glass accessories.
- Methodology of design of auto installation units of glass accessories by various means of repetition.
- Experimental study for execution of models of glass self-installed glass accessories by plunging.
- Technical effect of added values of design of self-installed units of glass accessories.
- Technical effect of assembly and installation of auto installed glass accessories units.

**First: Description and classification of glass accessories:**

**A- Description of glass accessories:** Accessories are the design or decorative units that are added to the basic elements of interior design. Accessories include large group of elements that are usually smaller in size than furniture. They may be installed in space for practical purposes or be installed for decoration and display purposes. They may also be used for service of set of purposes together. Accessories are divided into:

**Functional accessories:** functional accessories shall be considered to be connected to the specific functions of the space in which they are used.

**Non-aesthetic accessories:** Aesthetic accessories are of many and unlimited types with all materials such as the wood furniture ornaments, hearth structures and many other accessories that have practical nature in addition to their aesthetic value.

**Accessories play four important rules as follows:**

- ❖ Performance of function as accessory of architectural element (knob, holder, ornaments...etc.)
- ❖ Accesosry is code of utilization of the unit (symbolic significance) to indicate and confirm the job type, such as (if knob was deleted from the top of drawers, it would be difficult to distinguish the prodcut fuction, and the knob may be aesthetic accessory).
- ❖ Confrimation of the shape brand of the place or architectural element.
- ❖ Accessories have authentic fuction to improve the aestehctic properties of the shape of architectural element. Th at function may be the only function of accessories (Bendary, 2008, page 180)

**B- Classification of glass accessories of interior architecture:**

Glass supplements can be classified according to the following elements as in the following figure (1):

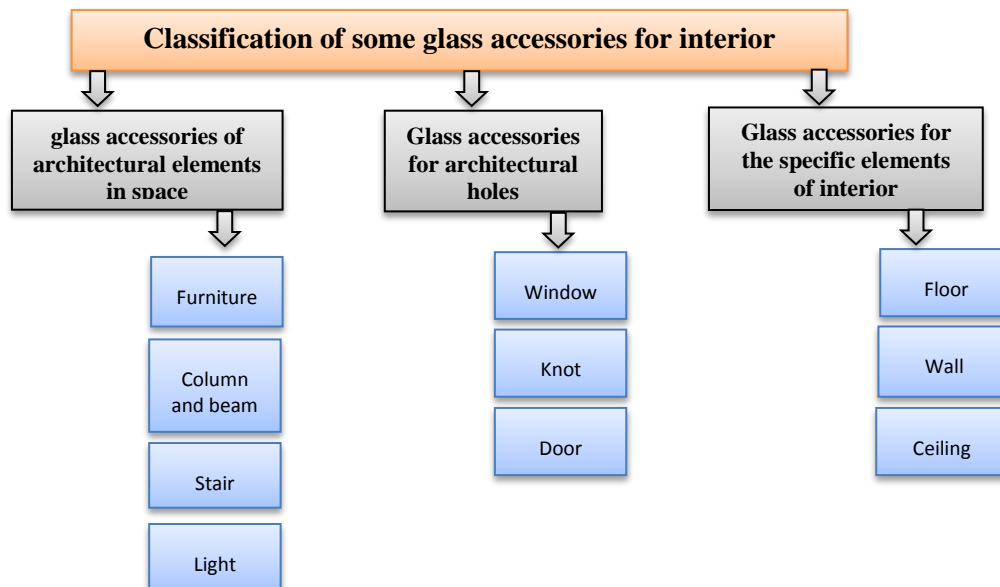



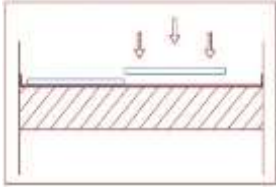

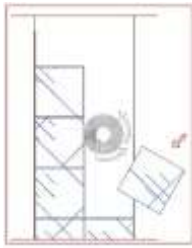

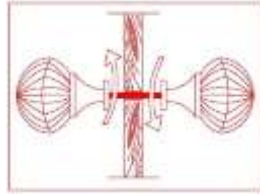
Figure (1) Classification of some glass accessories for interior design

**Second: Analytical study of some conventional patterns of installation systems of glass accessories:**

Shapes of glass units used as accessories vary. There are many conventional installation systems, including:

- Installation using adhesives
- Installation and tying with bolts
- Use of glass containing metal units as in knobs

Here is analysis of some examples of the conventional systems and methods of installation and assembly of some food accessories.

Unit	Materials	Production method	Dimensions (cm)	Installation
 Glass tiles	Glass	Withdrawal, cutting and mounting to the steel chassis for glass pieces with structural elements such as cement.	Glass tiles 60*60	
 Square solid glass tiles	Glass	Separate plunging of each half of tile, then the two sides are combined together and fixed by adhesives or the two sides are fixed after formation by plunging before cooling	Repeated units 20*20	
 Door knob	Glass and metal	Formation of glass by casting or plunging them assembly of glass by suitable adhesive with metal	*10*10 15	

**Third: Methodology of design of self-installed units of glass supplements by various methods of repetition:**

**A- Repetitive pattern as an approach of design:** Repetition is one of the solutions applied by designer as creative plastic style of one of the forms or elements for conditions imposed by area, body or application requirements. It is one of the methods that increase the shape richness. Designer can reach the highest aesthetic value that carries attractive tone, rhythm and diversity as part of the movement that it emits in the work. Repetition has several aspects

that start from simple to more complicated and from part to whole so that shape consists of parts and wholes according to repetitions that vary and multiply in patterns.

### **B- Self-installed glass accessories:**

The study resorted to design of glass accessories units to be automatically installed and assembled to design units without depending on the means of connection or assembly to reduce the feeling of unit form, and not to depend on connections that cause visual noise to units while connected. This method of installation is applied to avoid obstruction of the installation parts (when other materials are applied) of parts of the design so that they are not in conflict with part of the design or obstruct the design to put installation, subject to increase of unit thickness to the suitable limit that allows possible application of open installation, according to figure (2).



**Figure (2) Installation of parts of self-installed glass accessories (vertical diagram of dovetailing the two units)**

In addition, the proposed installation method allows more than one position of design when its place is changed, to be too flexible to complete each other for all or some of its sides without appearing defective or fragmented.


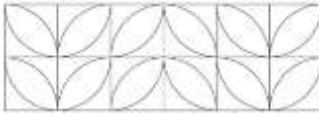

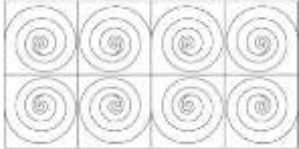

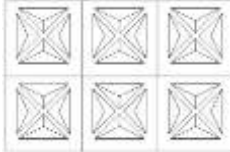
### **C- Methodology of design of self-installed glass accessories**

Design approaches vary in frameworks that depend on application of various mental approaches to set innovated solutions in product design. Because design undergoes several phases of collection through classification to analysis of information, innovative alternatives and solutions are laid and the most suitable and proper to satisfy the aesthetic and use purposes of the product are chosen.

### **D- Design of integrated units by repetition:**

Repetition is one of the basic approaches on which utilization of glass units as accessories in interior architecture depends. It is allowed by the technology of formation by plunging for multiple and repeated production. It can be utilized as accessories that usually depend on repetitive approach of design, so there was attention to the element of repetition and its effect on the various approaches of design to be suitable to the approach of the research for design of self-installed units that depend on repetition style.

In spite of the several advantages of repetition, monotonous selection of design elements or units may lead to monotonous design and failure of design to satisfy the aesthetic and design purposes. Therefore, various designs were set for auto-installed glass supplements and their exterior shape was installed to confirm one of the key variables, which is the exterior shape, as follows:

Unit	Design notes	Alternative repetitive designs of unit
	<p><b><u>Organic shape is flexible and has curved lines:</u></b> This unit is optimal as compared to the geometric units of straight lines in their sculptural shape. More than one different and diverse design was produced on repetition of units at various positions and directions and repetition of the shape itself.</p>	
	<p><b><u>Curved shape:</u></b> This shape produced dynamic depth, as a result of interference of circles in design which attracts attention without focusing on that all produced designs are different. This difference can be distinguished after making the solid units.</p>	
	<p><b><u>Geometric shape:</u></b> This shape is characterized by sharp lines and appears as regular specific and geometric structure. Its repetition results in monotonous undiversified pattern because it is conventional and identical shape that doesn't contain design movement to be perceived by sight.</p>	

Alternatives were made for arrangement of units together by creating diversity of the use of units and number of units per element in composition. This resulted in huge and diverse number of designs because of exchange and consistency between the squared elements and their exterior form for production of large number of diverse designs for the same consistent formations of the outputs of the proposed glass supplements as in figure (3).

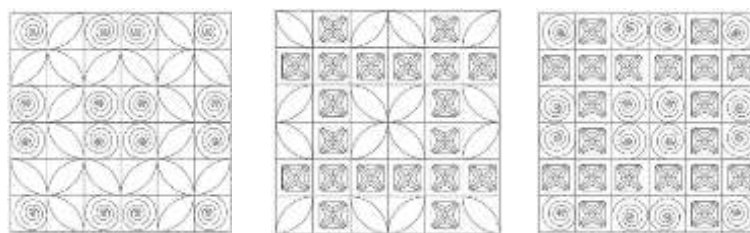


Figure (3) Design alternatives that result from use of two units

#### **Fourth: Experimental study for execution of forms of self-installed glass supplements- by plunging:**

**A- Manual plunging and production phases:** Manual plunging is done using special machines to be used in plunging of fused glass.

**B- Components of glass formation mold by hand plunging:**

- Plunger- Ring – Mold (Mutawie H, 2011)

**C- Phases of glass production by hand plunging:**

- Preparation of glass assembly, plunging, removal of glass (Al Latif, 2014)

#### **D- Plunging and how to customize it to match the unit design and diversity of formations of the same mold:**

Glass production by plunging is usually used to form large numbers of products as production by plunging provides high capability of control of glass pattern which depends on formation of repeated units.

Mold formation of the squared unit is done to get various alternatives in shape and composition. Mold is designed to produce more than one unit by various formations and economic efficiency, by installation of the mold body and plunger. Change of the base which is the main part and container of formation is made to enable production of units of various formations with prominent, hollow and various formation. Figure (5) indicates installation of the mold used in the experimental study>



Figure (5) Varius bases according to each design, which are made in various shapes

To make it easy to replace the bases for production of various shapes, innovative method was reached for execution of plunging mold of this unit, by using the blowing mold for formation by blowing and making some amendments to it to match the plunging technology according to the following figure (6). Figure (7) shows the glass units executed in the experimental study. It provides possible interference of units according to the installation pattern.



Figure (6) Shape of the mold manufacturing of blowing mold to match the compression method for the various bases that are used



Figure (7) interference of glass accessories units

#### **E-Considerations of execution by compression for production of auto-installed units of glass accessories:**

Several facts shall be taken into account to get the units designed with the required specifications as follows:



- ❖ It is preferred to use low viscosity glass to increase liquidity of glass during formation for easy formation to get the ornamental formations by mold at the required accuracy.
- ❖ Accuracy shall be considered and glass assembly weight shall be followed to get units of the same or closely similar thickness to avoid stresses during cooling and excesses and deficits during production.

**F- Functionality of glass accessories to the function of architectural element that contains it:** Those units can be used in several architectural elements, including furniture and walls as transparent light permeable holes or insulation and vision dispersing units or as separations between walls as in figures (8) to (10).



Figure (8) Image of some units that were produced by assembly with each other



Figure (10) multiple function shapes of units as auto-installed glass accessories with various shapes

### **Fifth: Technical Effect of added values of design of auto-installed units of glass accessories:**

Artistic effect of some added values of design of auto-installed units of glass accessories was defined as follows:

- ❖ By setting design of units, if possible to use those suitable and various dimensions (of large size to match repetition) for more than one alternative unit in more than one place of the interior architectural elements and to use them by more than one design alternative to achieve the aesthetic and functional value.
- ❖ It was possible to control the unit thickness to match their function. The thin thickness of unit can be used and put as hangings that can be adhered or installed on solid areas of furniture or making parts of interior architectural elements as aesthetic units of bed, for example, while big thickness of units can be utilized to be structurally used to bear the consequences of relatively heavy loads. As example, handrails, insulations, stands, seals and accessories of walls can be made of those glass accessories.

### **Sixth: Technical effect of assembly and disassembly of auto-installed glass accessories**

- ❖ This method of installation is designed and executed for avoidance of the defects of other materials (over time) that are used with glass such as the metal installations made of materials in case of stain, corrosion, change of color or instability of adhesives.

- ❖ Assure the aesthetic value of glass element singly in terms of design and installation with no need to use other material that leads to barring of vision at the limits of other material so that it requires more concentration to perceive the design as a whole in contrast to design by the single material.
- ❖ To avoid appearance of midline on the appearance of glass surface, take into account that molds are made on fixed lower part and movable sides to avoid appearance of midline of the unit that appears as defect on use of two-part mold.
- ❖ On choice of design of complicated external lines, consider that the design of complicated exterior limits is not used for easy execution and application of repetition without any obstacles during installation.

### Results:

- Glass accessories are designed and classified.
- Methodology is established for design of self-installed glass units of glass accessories by various means of repetition.
- Execution of some practical methods by plunging for production of some auto-installed glass accessories.
- Define, analyze and conclude the key artistic and technical variables that affected the production of self-assemble glass accessories by plunging.
- They key limitations of artistic and technical effect of added values of design and execution of self-installed units of glass accessories were established.

### Recommendations:

- The researcher recommends to utilize the field of (theoretical- practical) study as applied methodology for development and upgrade of the efficiency of small industries in the various (technical- industrial- architectural)fields of glass
- The researcher recommends completion of the methodology of scientific study as applied study for enrichment and diversity of the elements of study for the approaches of design and production of glass accessories in Egypt.

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