

The effective impact of using computer programs in design of glass jewelry using casting method

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Introduction:

Jewelry is considered one of the main elements demonstrating man desire for continuous search for beauty; that beauty, which usually relates to his environment and his desire to communicate with the society. Over centuries and with the development of human arts in various civilization centers, the jewelry industry, in general, and the glass jewelry in particular, spread to various parts of the world, and emerged as one of the fields of jewelry that carry distinctive aesthetic values and implemented in different techniques.

With the technological and scientific development, it was possible to use the glass as a distinctive raw material for the jewelry industry, with its included special potentials to display the different aesthetic values within the technical diversity of the forming processes, that helped to enrich the innovation in the jewelry industrial art, creating for itself a special area in design and production.

Glass jewelry has been subjected to electronic programming requirements, both in design and in production, and new tasks were added for the designer, the most important of which is to match between his innovative capabilities to solve the problem of design and between a range of technical, economic and functional information, as the emergence of design and production using the computer programs CAD-CAM have helped in achieving progress, innovation, renovation and rethinking, all that surrounds the process of design and production.

Research problem:

Lack of use of the computer potentials in enriching the design system for glass jewelry produced by casting method.

Research Objective:

To develop a set of scientific and technical foundations to take full advantage of computer potentials as an added value to enrich the design process and develop non-stereotyped alternatives to the design of glass jewelry produced by casting.

Research hypotheses:

By using computer capabilities and analysis of glass design systems, the most important scientific and technical foundations for enriching the design system can be reached.

The importance of the research:

Its contribution in the development of the field of glass jewelry industries and enriching the scientific library in the field of glass design using computer.

Research Limitation:

The research is limited by the use of computer software (Rhino) for glass jewelry produced by casting method through analytical and experimental methodology **Research Results:** Setting the scientific and technical foundations for using the Rhino program in the design of glass jewelry produced by casting method.

The research studied the following topics: -

To achieve the research objective, the study is based on the following topics:

1- **Glass jewelry design systems:** A classification of glass jewelry design systems was achieved in terms of single and assembly construction design systems as follows:

Single construction design systems:

Types of single construction design systems for glass jewelry according to the following trends:

A) Design system according to the construction form: (design of the external Construction Frame - design of the internal Construction).

B) Design system according to the nature of the configuration: (2D configuration – 3D configuration)

C) Design system according to the design structural units: (one-unit single design – multiple units single design).

D) Design system according to the decorative pattern: (pattern style - organic style - geometric style).

Assembly construction design systems:

A) A design system that conforms to the direction of construction: (linear assembly system - concentric assembly system – integrated assembly system "concentric with linear")

B) Design system according to construction of the unit (jewelry unit): (repetitive assembly system {regular / variable} – mixed assembly system).

2- **Technology for production of glass jewelry using casting method:** methods of forming glass jewelry using casting method were studied, which included thermal restructuring of the glass and cast construction from molten glass, and then the techniques of formation of glass jewelry using open and closed molds in either methods and the consequent effect in the final shape of the jewelry unit was explained.

3 - **The basics of using the computer in the design of glass jewelry executed by casting method:** The foundations of using the computer in the process of glass jewelry design by casting method were classified to several stages (Phases) as follows:

The Design Phase (of glass jewelry): in which the foundations of using the computer were divided into the 2D graphic design phase, and the 3D modeling phase as follows:

The 2D graphic design phase: Discusses the role of the computer in both the drawing and modification stages.

3D Modeling Phase: Discusses how the computer builds 3D models in terms of solid modeling (which are exposed to modeling using Primitive Models, modeling by extrusion) and surface modeling.

The Design Rendering Phase (of glass jewelry) The role of the computer in this stage in terms of its role in the design packaging using the appropriate material, taking into consideration the characters of the added material, its role in adding shade, color, texture and lighting effect to give the scene of realistic perception, the potentials in showing the details of the product and its functions and aesthetics, as well as performing the graphic design and executive drawings, and the clarification of connection and installation methods, and other potentials that show the impact of the computer in this stage.

The design evaluation phase (of glass jewelry): The role of the computer in the process of evaluating the products of glass jewelry was defined in terms of constructive evaluation of the structure of the product, examination of the points of both strength and weakness in the parts of the product and suitability of the jewelry piece to anthropometric measures and the various positions, and calculation of weights of used raw materials per piece.

Research Results:

- The systems of single built and assembly built glass jewelry were monitored as an input to the formulation of design ideas for jewelry.
- Setting some scientific and technical foundations to take full advantage of the computer potentials as an added value to enrich the design system.
- Development of non-modular alternatives for the design of some types of glass jewelry by casting method using the Rhino program.
- Study and application of computer programs and systems contributes to the development of glass jewelry industries, and enriching the scientific library in the field of design of glass jewelry.

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