

The Effect of the Contemporary Digital Revolution on the Forms of Metal Furniture and Construction Products

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Abstract:

In recent years, the world has witnessed tremendous development in computer science and applications. We live in what is known as the era of **the digital revolution**. The digital revolution has greatly influenced the design of products. Designers used advanced computer programs to create designs for products with new shapes characterized by complexity and inspiration from nature. It is called “**digital shapes**” or “**parametric shapes**”, which is a new design language for products with formal formulations that are completely different from the usual shapes for product design, and its spread was aided by the tremendous development in contemporary production techniques and new materials, all of which contributed to the emergence of new design trends with starting points, philosophies and references Different than the previous ones, and from here arises the research problem

Problem: In the context of the designer’s constant quest to search for new design languages to build product shapes, as well as the close connection between technological development and design trends, the research problem crystallized in the need to know the references and features of contemporary product shapes in light of the digital revolution in computer software related to design, as well as the tremendous development in Production technology and new materials, and the accompanying development in contemporary design thought to comply with digital intellectual trends, which opened new horizons for product design and added to the designer’s creative and innovative capabilities.

Objective: The research aims to study the impact of the contemporary digital revolution on the design of product shapes.

Methodology: To achieve the research goal, the researcher followed the descriptive analytical method.

Results: 1) Digital shapes are a new design language for products, with complex and unusual formal formulations, including those inspired by nature. Their spread was helped by the tremendous development in parametric design programs, production techniques, and new materials. 2) Within the framework of the dialectic of the dependency of form in product design, the slogan “form follows technology” has prevailed in the current era. Digital technology has brought about a boom in product forms, as the designer has found the tools that enable him to represent his design ideas, regardless of the degree of complexity of the form. 3) The importance of parametric design is demonstrated during the various stages of the product design process, starting from the stage of developing design ideas through generating dozens of design solutions with complex shapes with the possibility of previewing and modifying them in simple steps by controlling the values of the design input variables and ending with the implementation and production stage through some additional components. For 3D digital modeling software. 4) Digital modeling programs for parametric design support the creative side of the designer by simulating natural shapes with complex structures in simple steps through the use of some design algorithms for some theories of simulating natural shapes, such as fractal geometry theory and Voronoi theory.. 5) Parametric shapes are characterized by new formal features that are completely different from the features of traditional geometric shapes, such as being complex shapes, topological shapes, dynamic shapes that suggest movement, and chaotic shapes that are not subject to design networks or standardization. 6) Fractal geometry (nature geometry) is one of the formal patterns of products that have flourished in light of the contemporary digital revolution. Fractal geometry is one of the algorithms that parametric design programs rely on to codify the shapes of products inspired by nature in an easy and codified manner with specific steps. 7) Voronoi diagrams are commonly used in product design, inspired by the division found in natural shapes, thanks to the availability of modern programs for parametric design to generate these shapes and choose the best formal alternatives and structural solutions by applying the Voronoi algorithm that uses computational geometry to generate these shapes. 8) In addition to their distinctive shape, Voronoi shapes provide shapes that are stronger and lighter than their counterparts of non-hollow shapes, by removing areas of the surface (in the form of Voronoi diagrams) so that this does not affect their durability, and by using 3D printing technology this can be significantly reduced in the material used. It may reach 50%. 9) Three-dimensional digital modeling programs for parametric design have become one of the modern creativity tools that the designer relies on in the product design process. The methods of design have radically changed, and these programs have become an essential factor participating in the design process..

Research recommendations: 1) It is necessary for the designer to be familiar with everything new regarding

the methods, and tools used in the processes of designing and producing products and to benefit from this in developing specialized products. 2) It is necessary to train students to use digital modeling programs in designing products, as well as to use modern production methods for specialized products, such as 3D printing and laser cutting, by providing the computer laboratories of the department and college with these programs and machines to prepare them in a competitive way that suits the contemporary labor market. 3) The importance of studying contemporary digital forms in product design in terms of their component and characteristics, the design thought behind them, and the mechanism of building them using digital modeling programs, whether at the level of design education or at the level of the design profession.

Keywords :

Parametric shapes (parametric design), fractal shapes (fractal geometry), Voronoi shapes

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