"التطور التقني في تشكيل الخامة وأثره على الرؤية الجمالية في تصميم الأثاث خلال القرن ٢١ "

Technical development in the formation of the material and its impact on the aesthetic vision in furniture design during the ٢١st century

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Abstract:

The trend for modern furniture design begins with the industrial revolution, where furniture has become quantitatively produced in factories by machines instead of being made manually. Designers were able to produce new forms of furniture that fit the era of industry and modernity, leading to the digital revolution and new design trends that affected the design form of furniture, and provided the designer with unlimited possibilities to break out of the ordinary, as they sought to create a state of dazzling by presenting non-typical intellectual work on the development of the aesthetic form of furniture. The research aims to present a methodological vision that clarifies the role of the technical dimension depending on the material and the possibilities of its formation, in developing the aesthetic vision of furniture design and its impact on functional performance; Thus, developing the concepts of furniture design and formation, through the presentation and analysis of some modern models of designers' work during the 21st century; To study the design thought, the advanced technical transformation and the plastic abilities that occurred in the design of furniture.

Introduction:

The Industrial Revolution led to the emergence of what is called industrial design, which is the combination of art and science in producing machine-made products. The designer's efforts and abilities were directed to benefit from the capabilities of mechanization and new methods in production and marketing, as well as the use of new materials and the development of

mechanical furniture. All of this is considered a transformational movement in the world, from craft to industry as a transitional stage. This major transformation required technological thinking to deal with the new changes in a new manner. In the twenty-first century, the world witnessed a major boom and a digital revolution that was reflected in the field of furniture design and manufacturing. Despite the great development, it can be said that what we are witnessing is merely... The beginnings of using computers; Computer programs helped in developing the designer's imagination and provide him with virtual tools that enable him/her to modify and change the formal appearance of the product and imagine it from all directions. This saved the designer a great deal of effort and developed his style, which gave him new visual experiences through knowledge of organic shapes, lines, and relationships that he had never seen before, which helped stimulate his creative thinking skills.

Research problem:

1. The need of the industrial community in the field of furniture for a design methodology that defines the relationship between the possibilities of shaping the material with digital technologies that have emerged during the 21st century and the aesthetic design vision.

Search goal:

Providing a scientific methodology that determines how to develop the aesthetic vision of furniture design, based on the material, its techniques, and the possibilities of shaping it with digital technologies during the 21st century.

Research importance:

The importance of this research lies in its scientific direction towards building the designer's mentality to develop his design work, based on the intellectual and design development movements of the world surrounding him.

Research field:

Furniture design.

Research Methodology:

Historical method.

Descriptive analytical approach.

Previous studies:

1. Duaa Abd al-Rahman Muhammad Judah - "Aesthetic and technological values for employing modern materials in "Interior Design and Furniture" - Master's Thesis - Department of Interior Design and Furniture - Faculty of Applied Arts - Helwan University 2000 - The thesis talks about the integration of aesthetic values, technological methods and methods in implementing design work in interior and furniture manufacturing using modern materials and emphasizing the basic role of raw materials in design mechanism.

2. Ahmed Samir Kamel - "The impact of modern materials on enriching the design thought of interior furniture" - published research - Department of Interior Design and Furniture - Faculty of Applied Arts - Helwan University - The research talks about the designer's benefit from technological progress and diversity in materials in developing design thought for furniture. Therefore, the research aims to clarify the role of raw materials technology, which had a great impact on developing the concepts of furniture design and assembly, and implementation using modern technologies.

3. Soha Samir Ramadan - "The impact of philosophical development in architectural thought on interior design for 21st century architecture" - PhD thesis - Faculty of Applied Arts - Helwan University - 2017 - The thesis talks about studying modern architectural trends in light of the developments that the world is witnessing, including the development of an important approach, to reach different theories that work on the development of interior design, and aims to find a reference for the architectural schools and trends of the late twentieth century and the beginning of the twenty-first century.

4. **First**: Technical development in shaping the material during the twentieth century:

• Wood steam shaping technology:

Michael Thonet developed the technique of bending wood using steam in various shapes. Thonet mastered two installation and construction techniques, which are the Molded Plywood technique and the Bentwood steam bending technique. Thonet's development of the chair made of solid wood, the steam bender is considered one of the most successful innovative products to date, as it had a strong impact on the course and direction of furniture design.

• **The use of metals in forming the seat structure:**

The situation in the use of furniture changed when Marcel Breuer tried to assemble his first modern tubular steel chair. Breuer was able to take advantage of the flexibility of the steel tube and came up with a tube curved in one continuous line. Once Breuer explored the technical possibilities of tubular steel, it was only a matter of time before the material's true potential became clear.

• **The emergence of plastic and synthetic materials:**

In 1948, Charles Eames and Ray Eames designed their first chairs made of fiberglass.

a. 2D laser cutters:

Laser cutting machines are a tool used in a wide range of industries for precision cutting and design projects. A laser cutting machine emits a high-powered laser beam to either cut or engrave a specific design on materials such as steel, plastic or wood. A laser beam is created through a process whereby an electrical discharge or lamp energizes the laser material within a confined container causing a chemical reaction, emitting a high-energy beam. The beam is then reflected using a mirror into a stream of monochromatic light. From the mirror the light is then directed via optical fibers or mirrors into the work area, with the narrowest point of the beam cutting or etching the design into the material. It enables the designer to make complex compositions and draw different patterns.

B. Computer numerical control (CNC):

Manufacturing developed with the beginning of the use of CNC devices, which relied on workers in work that consumed a lot of time, money, and human errors. The technology

contributed to reducing the time required for the product while reducing costs and the possibility of producing complex products. The CNC router is a type of machine that is controlled by a computer, through which materials are ground, drilled, cut, and engraved. There are several different types of CNC machines commonly used depending on their intended purpose:

• CNC Milling Machine: One of the most common types of CNC machines, a CNC mill uses computer controls to cut various materials.



Recommendations:

1. The need for designers to pay attention to materials, their specifications, the possibilities of their formation, and how to adapt them to achieve both aesthetic and functional dimensions.
2. Paying attention to computer science and using modern technology that keeps pace with every era to obtain advanced, modern designs.

Glossary of terms:

• Digital manufacturing: It is a type of manufacturing process where the machine used is controlled by a computer. Where digital data directly guides manufacturing equipment to form different geometric shapes, this data often comes from CAD (computer-aided design), which is then transferred to CAM (computer-aided manufacturing) software. The output of a CAM program is data that guides a particular additive and subtractive manufacturing tool such as a 3D printer or CNC machines.

• Diagram: Voronoi Cell Voronoi diagrams, also known as Voronoi Tessellations, at different levels in natural cell structures, honeycombs and animal fur patterns, are a system that divides space into subspaces in an organic way. In mathematics, it is defined as a method of dividing a surface into a number of smaller areas.

• ABS material: Acrylonitrile butadiene styrene is a type of plastic that is an opaque thermoplastic and an amorphous polymer.

Results 2. The digital revolution and the emergence of computer programs helped to acquire new visual experiences by achieving organic shapes, lines, and relationships that had not been possible to see or implement before. The flexibility of using computer programs enabled the ease of adding, deleting, and merging quickly, and creating new configurations that helped develop aesthetic language in furniture design.

3. Modern materials and digital technologies have greatly influenced the development of the aesthetic vision, which was reflected in achieving the functional performance of the design in terms of flexibility, dynamism, interaction, and obtaining more complex free formations.

4. The diversity of materials and technologies is an incentive to develop innovative capacity and go beyond traditional thinking.

5. Material is no longer just a physical medium that carries form; Rather, the material has become an aesthetic element through its sensory and textural properties.