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MODELING GRAPHIC PATTERNS IN INTERIOR AND EXTERIOR DESIGN BASED ON ENGINEERING GRAPHICS

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Abstract

This article analyzes the artistic, aesthetic, and functional significance of graphic patterns in interior and exterior design. The processes of modeling patterns based on engineering graphics are explained on the basis of geometric construction, projection drawing, laws of composition, 3D modeling, and parametric design technologies. In addition, the methods of adapting patterns to the spatial environment using modern digital programs are scientifically substantiated.

Keywords

graphic pattern, interior design, exterior design, engineering graphics, geometric construction, composition, 3D modeling, parametric design.

At present, the use of graphic patterns in the field of architecture and design is considered one of the most important directions of modern artistic expression. The role of patterns is invaluable in aesthetically enriching interior and exterior environments and in harmonizing national and modern styles. Graphic patterns not only serve a decorative function but also play an important role in shaping spatial balance, ergonomic comfort, and visual perception. The process of creating graphic patterns and correctly applying them to the design environment is directly related to the principles of engineering graphics. This is because the accuracy of any pattern, the harmony of dimensions, spatial placement, and the repetition system are implemented on the basis of engineering graphics. Therefore, this article scientifically highlights the ways of modeling graphic patterns in interior and exterior design based on engineering graphics.

A graphic pattern is a pictorial composition formed on the basis of geometric shapes, plant-based ornaments, symbolic, and abstract elements. In interior design, it is widely used in wall decorations, ceiling panels, floors, furniture facades, stained glass, and lighting design. In exterior design, it is used in building facades,

porches, fences, sun-protection panels, fountains, and urban architectural structures.

The main functions of graphic patterns include:

– improving the aesthetic appearance of space;

– creating visual rhythm and balance;

– visually expanding or narrowing the spatial volume;

– ensuring the harmony of national and modern styles;

– giving an individual character to the design object.

In addition, patterns influence human psychology. The harmony of color, form, and composition evokes positive emotions in people and makes the environment comfortable and attractive. Engineering graphics is a scientific field that studies the laws of graphical representation of technical objects, structures, and forms and serves as an important theoretical basis for pattern modeling.

The following graphic concepts form the basis for pattern creation:

– geometric shapes (circle, triangle, rectangle, polygons);

– symmetry and asymmetry;

– proportion and scale;

– rhythm and repetition;

– perspective and projection.

With the help of engineering graphics, patterns are:

– constructed on a plane based on precise dimensions;

– represented in spatial form through projection drawing;

– organized from repetitive fragments based on a modular system.

These processes ensure the technical accuracy, structural strength, and suitability of the pattern for the design environment. In the modern design process, 3D modeling technologies are widely used in pattern creation. With the help of software such as AutoCAD, SketchUp, 3ds Max, Blender, and Revit, patterns are modeled in a three-dimensional form and adapted to real environments.

Parametric design enables the automatic generation of patterns based on mathematical formulas and algorithms. Through this method, it becomes possible to:

– create complex geometric patterns;

– adapt patterns to various sizes and shapes;

– save time and resources.

Using 3D models, designers can:

– evaluate the appearance of patterns in real environments in advance;

– analyze the effects of light, shadow, and color;

– determine the level of ergonomic comfort.

In interior design, graphic patterns are applied in the following areas:

– wall panels and decorative compositions;

– ceiling compositions;

– floor coverings;

– furniture facades;

– lighting systems.

In exterior design, graphic patterns are widely used in:

– building facades;

– fences and porches;

– landscape elements;

– urban architectural objects.

Patterns modeled on the basis of engineering graphics serve not only as aesthetic decoration in these areas but also perform constructive and protective functions.

CONCLUSION

In conclusion, modeling graphic patterns in interior and exterior design based on engineering graphics is an integral part of the design process. Geometric construction, composition, 3D modeling, and parametric design technologies allow patterns to be created with high accuracy, aesthetic quality, and functional perfection. Patterns created with the help of modern graphic software increase the artistic value of design objects, ensure ergonomic comfort, and harmoniously integrate national and modern styles.

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