Research on Interior Scene Design Based on Cinema4d Technology

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Abstract: This paper completes the 3D virtual interior scene modeling and design based on Cinema4d software technology. Through a full range of simulation analysis, to select environmentally friendly materials, match reasonable space structures, make full use of the space, and improve the utilization of indoor space. By making models of various parts of the interior design and building walls and windows, the entire interior space is designed. Finally, the interior design was rendered through lighting to ensure the expected design effect. Experiments show that the realism of 3D indoor scene design is higher than other similar methods, and it is suitable for 3D virtual scene design. It is hoped that the research in this article can provide some reference on feasibility for interior scene design.

1. Introduction
The advancement of computer graphics technology has promoted the development of 3D virtual reality technology and 3D modeling technology. Such technologies involve advertising design, display design, interior design, web design, multimedia teaching and other fields. Interior design refers to the activity of combining people's environmental awareness and aesthetic awareness to capture space from inside of the building. Broadly speaking, interior design is an artistic activity that can improve people's living conditions. Interior design especially refers to the comprehensive design of indoor environment and visual design. It not only includes engineering and technical aspects, such as sound, light, heat and other physical environmental issues, but also includes the atmosphere, ideology, and other psychological environments, as well as personal characteristics and the creation of other cultural environments.

In interior design, every effort should be made to create an ideal space-time environment to serve people's social and family life. At the same time, one must always focus on different technical and artistic entities. But it must be clear that what is really pursued in the design should be the perfect space-time composition of the "virtual body". In other words, in interior design, the "reality" of technology and art is the method, and the goal is to realize the ideal "virtual" living space environment.

Cinema4d is a 3D drawing software developed by the German company Maxon Computer. It is known for its extremely high calculation speed and powerful rendering plug-ins. It has excellent performance in advertising, film, industrial design, etc. For example, in the production of "Avatar" 3D Shadow Motion Research Studio, Chinese employees designed and produced some scenes using Cinema4d. In such a blockbuster, Cinema4d shows its excellent performance. This article applies 3D
virtual scene modeling and rendering technology of Cinema4d to interior design, by analyzing internal green design, material environmental protection and interior model design effects, in order to provide related reference for interior design.

2. 3D Virtual Indoor Scene Modeling and Design Steps

Carry out 3D modeling and design for indoor scenes. Figure 1 uses Cinema4d software to model and design indoor virtual scenes.

Table 1 Cinema 4d software visual scene modeling and design procedure

| Scene-M | Object-M | Adjustment | Rendered-E |
|---------|----------|------------|------------|

Open CINEMA4D, select the project window in the toolbar file, rename the project folder, select the save path, and click Create Project Directory. Select Settings/Preferences in the window, and change the working unit to centimeters in the settings to prevent the software from stalling due to excessively large projects in the later period. First, make the interior wall. Open CINEMA4D, create two new planes, press C to convert them into editable objects, click the smooth coloring label of the outline plane, and change the angle to 0. Open the OC toolbar, create an OC glossy material, adjust the roughness floating point value to 0.4, and modify the color to gray, and drag it to the flat part to attach the material. Then create the cube, modify the appropriate size, and make the wall. For the cube, modify the X, Y, and Z values to the appropriate size, set the number of segments in the XYZ direction to 2 segments, press C to editable objects, and then switch the line tool to perform linear cutting for the cube designed in the above figure. The whole process can be seen from Figure 1 to figure 2.

Figure 1 Making the Interior Wall

We cut the 4 vertical lines and 1 horizontal line after the previous linear cutting at a time. The purpose of cutting is to preserve the gaps in the wall, and then select the switch surface tool to recycle the selection. For the reserved 5 gap surfaces, select the right mouse button to process, and select the chamfering step to process the entire wall surface. After the above steps are completed, we create a mirror image to symmetrical the previous wall. The specific process is first to select the appropriate tools, and symmetrically process the wall cubes built before, and then you can see that multiple walls
appear after symmetrical treatment.

![Create a Mirror Image](image)

**Figure 2 Create a Mirror Image**

Another focus of the interior design is the design of doors and windows. After completing the wall design, by creating a cube, modifying the X, Y, and Z values to the appropriate size, as the interior left window. Then turn the window cube into an editable state, select the switch tool, remove the two faces of the cube, select the remaining 4 faces, and then click the right mouse button to extrude. At this time, the cube appears in a hollow state, and then we change to other processing tools and chose linear cutting. The purpose is also to cut out the gaps in the window. This processing process is as follows:

![Interior Design of Doors](image)

**Figure 3 Interior Design of Doors**

After the first window is created, select the window, switch the processing tool, select the clone tool, and clone the created window. The number of selected clones is 3. The rendering at this time is as follows:
After building the window, we create another plane and place this screen on the left side of the window, and in post-processing, when selecting material, we can choose a picture as the scenery for building the window; at the same time, to create a new cube on the other side and place it behind the existing wall. This processing process is as follows:

To create a glossy material, adjust the roughness floating point value to 0.4, modify the color, mainly off-white, click on the diffuse layer to give the wood grain texture and wall marble material map to the corresponding object, then you can get a more bright interior design.
3. Interior model rendering

3.1. Light settings
This process employs the most popular OC renderer on the market. First, set the lights in the scene, open the octane toolbar, create Octane daylight and Octane HDRI environment balls under the object command, and select Octane in the outline Daylight, modify the attributes, check the hybrid HDRI environment, set the turbidity value to 4, adjust the power to 1.89, and set the sun size to 4.1; select Octane Sky's Octane environment label in the outline, modify the following attribute parameters, and select the appropriate HDRI environment ball map, The power is set to 1.

![Figure 6 Light Settings](image)

3.2. Render settings
First open the render settings, modify the renderer from the standard renderer to OctaneRender renderer, set the width to 1920 pixels, the height to 1080 pixels, the resolution to 72, the frame rate to 24, the starting point to 1F, and the ending point to 240F, then set the save path of the rendered sequence frame, the image format is JPEG, set the quality under anti-aliasing to the best, and then click the rendering button to start batch rendering.
4. Experimental results and analysis

4.1. Comparison of fidelity of indoor scene design

According to the comparison of the fidelity effects of the current mainstream renderers, several representative renderers are selected. The specific effects are shown in Table 1:

Table 2 Comparison of rendering fidelity for various renderers

| NO. | Renderer | Rendered Effects |
|-----|----------|------------------|
| 1   | Redshift | It can effectively render very large scenes, far exceeding the available video memory. It is suitable for animation, film and television special effects, advertising, architectural design and other industries. |
| 2   | Mantra   | It is a multi-paradigm renderer that can trace sweeping lines and ray. It is also a renderer based on Mantra physical rendering. |
| 3   | Arnold   | It has always been a benchmark in the industry, with real rendering and excellent detail effects. Arnold is mostly used in the field of movies. |
| 4   | Vray     | Vray can render extremely realistic images, and is mostly used in interior design and car rendering. |
| 5   | Octane   | The OC renderer is the world's first true GPU-based, versatile, and physically-based Octane renderer. It is easy to produce effects, faster, real-time rendering and does not require too long feedback time. |

4.2. Performance comparison

By analyzing the fidelity performance of mainstream renderers, the results of Table 2 below are obtained.

Table 3 Comparison of the fidelity of the renderer

| NO. | Renderer | Advantage | Disadvantage |
|-----|----------|-----------|--------------|
| 1   | Redshift | RF is a biased GPU renderer, so the rendering speed is not required for the performance of the graphics card. Redshift is often fast and produces almost no noise. | There are requirements for the performance of the graphics card, Support N card, not A card. |
2 Mantra
The volume dynamic blur effect is particularly good, animation and models can be imported into Mantra from other production programs. The sampling value is large, the rendering speed is slow, and it takes a long time.

3 Arnold
Based on physical algorithms, so the rendering effect is more realistic. Node operation plus rendering settings and layered rendering. the settings are simple and clear, so in terms of production effects, the idea is clear and easy to use. The rendering speed is slow, and the caustics effect is obvious, and the indoor rendering noise is very high. Solving these problems will sacrifice other effects.

4 Vray
The panel design is user-friendly, the picture quality is good, the material support is comprehensive, The lighting effect is real, and it performs well in large scene processing. It can be used as a general proxy model for other Vray platforms such as Max, Maya, and Rhino. The computer hardware requirements are relatively low, and the operation is simple and the effect is easy to produce under the same effect setting. the stand-alone rendering speed is medium to slow (the linking opportunity is much faster), and there are still some unstable factors that have not been resolved.

5 Octane
There is no too many parameter adjustments for node mixing, which is simpler than standard renderer. It is quick to get started, and easy to produce effects. The requirements for the graphics card are high, and the A card is not supported.

Through comprehensive performance comparison, the OC renderer is used for realistic rendering in this interior scene modeling design process.

5. Conclusion
Currently, 3DMax, Cinema4d, Maya and other 3D modeling software can usually be used to create integrated 3D model diagrams. These three software programs have their own emphasis. For example, 3DMax is increasingly used in architecture and interiors. In terms of design, Maya is more used in industrial film production (for example, many Hollywood blockbusters use Maya), while Cinema4d is currently used for advertising and column packaging. For interior design, the author recommends Cinema4d, because Cinema4d is easy to use, cheap and more user-friendly, and the software does not require high-level computer configuration, and provides a wide range of preset library (Cinema4dR20). The size of the software is about 10GB, the main body size is less than 1GB, and the rest are preset files. Therefore, it is more suitable for personal use and small project design, such as interior design. This article uses Cinema4d technology to conduct a comprehensive simulation analysis of interior design. First, it includes the green design concept of interior design: try to choose environmentally friendly materials, and integrate the design style with nature, with a reasonable space structure, make full use of space, and improve the interior space utilization rate, through the common interior design model, to build walls and windows, in the end, the entire interior space is designed. And finally through the lighting rendering, the interior design is rendered, and the expected design effect is achieved.

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