

# Study of Energy-Efficient Building Issues in Architectural Decoration

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**ABSTRACT** Creating green, energy-saving and environmentally friendly building products is the main theme of construction industry in order to achieve sustainable development. The study starts with innovations in energy-saving designs and energy-saving construction of a building's interior decoration and other important aspects that use energy effectively, improve energy efficiency, as well as providing people with healthy, comfortable, natural and harmonious living and working environment, while realizing sustainable development of construction.

## KEYWORDS

House decoration  
Energy-efficient building  
Energy saving

## 1. Introduction

An energy-efficient building work has a lot of facets, and energy-efficient building of architectural decoration is an even important part, directly impacting the effect of the whole energy-efficient building work. Therefore, energy-saving issues of each item should always be paid attention to in the actual operation of the work process. We will analyze issues regarding the decoration project's energy-saving measures, methods, approaches, designs, energy-saving elements and other concerns.

## 2. Measures for achieving energy saving and environmental protection of building engineering

### 2.1. Energy saving and environmental protection of house decoration

At the beginning of decoration effort, energy-saving programs should be designed according to the structure of the house and the owner's requirements, and its comprehensive construction will be processed after energy-saving decoration scheme is determined. In particular, we should pay attention to energy-saving design of water, electricity and material usage, as well as energy-saving construction

of the building envelope, some creative energy-saving construction, and others.

### 2.2. Energy saving and environmental protection of constructions

At the initial stage of decoration construction, we should protect the completed energy conservation and environmental protection facilities, and not dismantle or damage them during future construction. We should rigorously test the already purchased wall materials, insulation material, lighting equipment, doors, windows, and etc., and then manage the construction work according to provisions of energy saving and environmental protection to achieve the design's effects. Specifically, under the premise of ensuring construction quality, we should minimize the usage of the engineering materials in decorations and strictly control the amount in order to eliminate waste during construction.

### 2.3. Energy saving and environmental protection of energy saving and environmental protection materials

In constructing decorations, we should focus on the use of latest scientific and technological achievements, maximizing control for facilities with high consumption and minimizing energy consumption in order to meet energy saving and environmental protection requirements, such as installing energy-saving and water-saving equipment for users.

For functional areas and space division of architectural interior in decoration design, environmental protection and energy saving factors should be considered in order to avoid or reduce remedial measures employed to conform to interior's function. Ventilation, lighting and other issues

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can be solved by using adjustable, removable furniture as well as translucent partitions and other ways. Also, plants suitable for indoor cultivation can be selected for clean air and to naturally adjust indoor temperature.

### **3. Key energy-saving points of interior decoration design**

The interior space is defined by the floor, wall and top surface, thereby determining the size and shape of interior space. The purpose of indoor decoration is to create suitable, beautiful indoor environment. The floor and wall of indoor space are backgrounds used for protecting people, furniture and furnishings, and the difference of the top surface provides the indoor space with more changes.

#### **3.1. Key energy-saving points of base surface decoration design**

Base surface decoration and flooring surface decoration are very important elements within people's visual range. Flooring surface brings most contact with humans. Its sight distance is very near and it has a dynamic variation, so it is an important factor in interior decoration. Its design should meet the following principles:

(1) The base surface should be coherent with the overall environment, and comparisons of its advantages and disadvantages should be conducted to protect the ambience. As for the overall environment effect of space, the base surface should be coordinated with the ceiling and wall decor, which at the same time could complement each other with indoor furniture, furnishings and others.

(2) Attention should be given to the division, color and texture features of ground pattern. Ground pattern designs can be divided into three cases: firstly, to emphasize the independent integrity of pattern itself, such as adopting cohesive pattern in conference rooms could show the importance of the meetings.

(3) In fulfilling the requirements of flooring surface structure, construction, and physical properties when performing base surface decoration, we should pay attention to structural conditions of flooring surface while ensuring safety and convenience to structure and construction. We must not just single-mindedly pursue only pattern effects. The needs of physical properties such as moisture, water, insulation and others should also be considered. There are various forms and kinds of base surface such as wood floor, block floor, terrazzo floor, plastic floor, concrete floor, and etc., and they have a lot of pattern styles and colors that could be consistent with the entire space and environment and complementing each other.

#### **3.2. Key energy-saving points of wall decoration design**

Within the indoor visual range, walls are vertical to people's sight and are in the most significant position. In addition, walls are part of frequent contact with people.

Therefore, wall decorations are very important in interior design, and the following design principles should be met:

(1) Integrity: When designing wall decoration, we must fully consider unification with other interior parts in order to make the walls and the entire space a unified whole.

(2) Physical properties: Walls have larger surface area, with a more important position and higher requirements in indoor space. Their prerequisites for insulating sound, keeping warm and preventing fire are different than other components in the interior space due to different natures of space usage. For example, hotel rooms have higher requirements and general canteens have lower requirements.

(3) Artistry: In an interior space, the decorative effect of a wall plays a very important role in rendering and beautifying indoor environment. There is a close relationship amongst the shape of wall, partition pattern, texture and interior atmosphere. To create artistic effect of interior space, the artistry of walls cannot be ignored. The wall decoration process should be selected based on principles mentioned above, and it generally has the following forms: decorative plaster, decorative veneers, decorative painting and coil decoration. Here we will focus on coil decoration and, with the development of industry, there are more and more coils being used to decorate walls such as plastic wallpaper, wall cloth, fiberglass cloth, artificial leather, leather, and etc. These materials have the characteristics of wide range of usage, flexibility and freedom, various color variety, good texture, easy construction, affordable price and colorful decorative effect, and hence they are materials widely used in interior design.

### **4. Construction essentials of energy conservation in building interior decoration**

#### **4.1. Doors and windows**

In the structure of building envelope, the window structure is the largest heat dissipation member of building envelope by its unique heat dissipation qualities. The thermal conducting pathway of a window is comprised of heat transfer and heat consumption of the overall window, which includes glass, frames, and cold (heat) consumption transferred through window gaps. For these two heat transfer pathways, we must first choose frame materials with smaller heat transfer coefficient such as resin plastic doors and windows, PVC doors and windows, AVPC plastic doors and windows, and etc.

Also, a blocking thermal bridge technology can be applied to enhance indoor thermal insulation function while reducing heat transfer coefficient of the process. Secondly, during assembly and installation stage, we should use energy-saving fittings and reduce installation errors to ensure accurate measures. In addition, to ensure lower air permeability and energy consumption, we should install sealing strip or replace the traditional single glass with double glass or insulation glass.

#### 4.2. Wall

Based on considerations of its indoor function, a wall must be smooth, flat and without significant concavity. When designing the wall model, with an attention to indoor fire safety requirements, targeted selection of materials with outstanding insulation properties can reduce interior heat loss. For rooms that require controlled heat transfers, in order to avoid heat spreading to other rooms without the need of temperature control, we must add appropriate insulation materials in the lightweight partition wall material in order to minimize the transfer of heat.

#### 4.3. Ground

As with interior walls, interior floor must be flat and smooth, and cannot have significant undulation nor meanwhile affect indoor ventilation. Since humans need direct contact with the ground, different materials with different characteristics even at the same material temperature may exhibit different feelings to human feet. Different surface layer heat-absorbing index of a material will result in different ground floor thermal comfort of another material. Based on heat index standards of different materials, the ground is divided into two main categories in our country: one is hard ground including Portland cement floor, wood floor, floor tile floor, terrazzo floor, and etc.; while the other is soft floor which mainly includes rubber floor, plastic floor, various types of wool and linen synthetic carpets, other textile floor and so on.

#### 4.4. Ceiling

Among the six surfaces of a building's indoor which include the four walls, floor, and ceiling, only ceiling truss design can adopt the form of irregularities. Ceiling truss design has a direct impact on indoor ventilation effectiveness of a building, effectively and reasonably guiding natural breeze indoor and it can ventilate and dissipate heat, which is an important significance to indoor energy

conservation in hot regions. In addition, the height after ceiling treatment also has a direct impact on indoor energy-saving effect and hence, when conducting interior decoration, the ceiling height is also an important factor that needs to be considered.

#### 5. Conclusion

Our country is a country in shortage of energy resources, and energy-efficient building is therefore a basic national policy. In a broad sense, energy-efficient building has the highest efficient use of energy with minimum impact on the environment, which means that through comprehensive integration of high-tech research and development as well as advanced technologies, the country will be using energy rationally and effectively in buildings, continuously improving energy efficiency to reduce energy consumption, improving quality and functionality of the building while saving energy, greatly reducing consumption of non-renewable resources and pollution of the ecological environment, while providing users with healthy, comfortable, environment-friendly work and living environment.

#### Conflicts of interest

These authors have no conflicts of interest to declare.

#### Authors' contributions

These authors contributed equally to this work.

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