

# Research on the Adaptability of Building Materials Application in Exterior Exterior Design of Buildings

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**Abstract:** The current level of development in the field of construction has gradually increased, at the same time higher requirements have been placed on the design of building materials. In this context, in order to maintain the good design effect of building materials and ensure the gradual improvement of its design level, it is necessary to pay attention to the adaptability research of building materials application in the exterior design of the building, and put its research work in order to improve the external form of the building design. Based on this, this paper discusses the adaptability of building materials application in the external design shape of the building, in order to provide some reference information for the enhancement of the appearance effect of modern building engineering, the improvement of the potential value of the project, and increase the production efficiency of the building field.

## 1. Introduction

Paying attention to the adaptability research of building materials application in the external shape design of the building is conducive to the efficient use of building materials with different functional characteristics, and the external design level of the building can be continuously improved in the long-term practice, and can design work for building materials. Rich practical experience is useful to meet the sustainable development requirements of modern architecture. Therefore, it is necessary to give the necessary attention to the application of building materials in the design by considering the functional characteristics of the exterior design of the building, so as to maintain the good design conditions and design effects of the exterior of the building and achieve effective effect on different types of building materials. use. On this basis, it is conducive to enriching the work of exterior design of the building and broadening the working ideas of its material design.

## 2. Analysis on the Development Process of Building Exterior Shape Design Materials

In order to achieve the expected results of the research work on the exterior design materials of the building, it is necessary to analyze the development process and provide the necessary support for the corresponding building material design work. Specifically in the following aspects:

(1) The relationship between the external form of the building and the building materials. In the analysis of the development process of exterior design materials, it is necessary to understand the relationship between the two. Specifically, it includes: the effect of the external shape design of the building is closely related to the selection of building materials; through the practicality and innovative consideration of the performance of building materials, it is conducive to improving the artistic expression of the external form of the building; With the support of building materials, it is conducive to providing the necessary reference information for the development of the exterior design of the building and the broadening of the ideas, and comprehensively enhance the potential application value



of modern buildings under the cooperation of architectural form design and building materials. A schematic diagram of the external shape material design of a building is shown in Figure 1.



Figure 1 Schematic diagram of the external shape material design of a building

(2) The external form of the building during the bud period. During this period, people's cognition of the external form of the building was low, and its historical development began with the simplest residence of human society. Like the primitive society, people did not fully consider the external form of the building, and more importantly, the function of building use. When this basic condition is satisfied, the external form of the burgeoning state emerges, which is beyond the scope of architectural function to some extent.

(3) The external form of the building in the vassal state. The external form of the building during the period of classical architecture was limited by the technical level at that time, which led to its independence. It also played the dual role of structure and enclosure while reflecting the appearance of the building. Since then, during the Renaissance, the establishment of the binary opposition theory of Alberti has further developed the external form of architecture.

(4) The external form of the building during the leap period and structural separation period. The external form of the building during the industrial revolution, due to the emergence and use of new materials such as glass and iron, accelerated the development of the external form of the building and brought a guarantee for the acceleration of its innovation. On this basis, with the change of the external shape design of the building and the development of the building technology, the building space has undergone corresponding changes, thus creating favorable conditions for the separation of the external form and structure of the building.

(5) The external form of the building during the diversified development period. With the strong support of eclecticism, classicism, and high-tech, through the use of different building materials, ideas and other elements, the diversified development of the external form of the building has been promoted, making its expression more significant.

### 3. Discussion on the Adaptability of Different Building Materials Application in Exterior Exterior Design of Buildings

#### 3.1 Design and Application of Different Types of Concrete in Exterior Forms of Buildings

(1) Application of fair-faced concrete. As a common external material for building, the construction of clear water concrete has maintained a good external appearance through the use of architectural design. In practice, by applying the characteristics of fine water, concrete aesthetics and remarkable soft texture of fair-faced concrete, the fair-faced concrete can be applied to the exterior design of the building to enhance its design effect and improve the corresponding design.

(2) Application of precast concrete. In the process of improving the construction quality and shortening the construction period, through the scientific use of large-scale precast concrete members, it is beneficial to optimize the external structural performance of the building, maintain its good external shape design effect, and promote its design work to be more targeted.

(3) The application of decorative concrete. As a concrete with good decorative effect, such as

texture, color and texture, it has achieved good effects in the practical application of decorative concrete, and can provide support for the increase of architectural form design effect and diversification of color texture, and promote its design work to achieve the desired results. Therefore, it is necessary to pay attention to the application of decorative concrete in the exterior design of the building to ensure the good condition of the shape design.

### *3.2 Glass Application*

The glass is a transparent, brittle-hard solid material which is melted, shaped and cooled at a high temperature by using quartz sand, soda ash, limestone or the like as a raw material. In the production process, often add appropriate materials or special processing to obtain special glass products, according to chemical composition, glass is divided into main soda glass, soda glass, aluminum glass, lead glass, borosilicate glass, quartz (silica) glass. Among them, the flat glass produced by the ordinary float method based on soda glass is widely used in construction. In the external design of the building, through the rational use of the glass, it is conducive to display the spatial order of the building, and realize the effective transmission of the building information, and enhance the overall layout of the building while enhancing the overall layout of the building. At the same time, through the consideration of different characteristics such as good corrosion resistance, erosion resistance, high mechanical strength, sound insulation, light transmission, easy cleaning, absorption of solar radiant heat, and artistic transparency, and the price is moderate, outside the building, if you can pay attention to the reasonable selection of different types of glass, clean glass, decorative glass, safety glass, energy-saving glass, etc., it will help to improve the exterior design of the building.

### *3.3 Application of Metallic Materials*

Metal materials have characteristics such as weather resistance and durability, which are beneficial to increase the structural strength in construction applications and meet the requirements for efficient construction. At the same time, because the metal material has the characteristics of simplicity, lightness, good sense of space, speed and strength, but the price is relatively high. If it can be applied to the exterior of the building to design intelligent light, it can realize the combination history of the design and the modern atmosphere, and with the support of effective design and processing methods, enhance the good visual effect of the external form of the building.

### *3.4 Wood Application*

As a material derived from nature, wood has been accompanied by the development of human history in the long-term practice, and has had a positive impact on the richness of classical Chinese architecture. The appearance and texture of the wood application process is good, but it has the characteristics of flammability, poor weather resistance and easy damage, and it is difficult to show good anti-corrosion effect in the use of wood which has not been effectively treated, which will affect its potential application value. Therefore, it is necessary to achieve anti-corrosion treatment of wood under the action of vacuum pressure, atmospheric pressure soaking and spraying, so as to meet the actual needs of the building exterior wall and other outdoor conditions. At the same time, because the wood comes from nature, it has the artistic characteristics of purity, simplicity, simplicity and naturalness, which can achieve the purpose of harmonious coexistence between buildings and natural environment in the external design of the building, and make the linear characteristics of the external materials of the building more obvious. On this basis, the design of the exterior form of the building can express an elegant and far-reaching design effect, thus enriching its design content.

### *3.5 Application of Natural Stone and Slate Curtain Wall*

In the selection of building materials, through the rational use of natural stone, the strength of the building structure can be improved and its service life can be extended. Natural stone has excellent properties such as durability, freeze resistance and abrasion resistance, and high compressive strength, which makes its potential application value increase, and can meet certain construction requirements,

but such materials are expensive. At the same time, because natural stone has the artistic characteristics of enrichment, warmth, rich color and calmness, if natural stone can be applied to the architectural appearance design, it can enrich the cultural connotation of the building, making its integrity and sculpture. The sense is more prominent, and the design conditions of the long-term practice of the building's appearance are improved.

By considering the design requirements and actual conditions of the building's exterior shape, if the application of the slate curtain wall can be emphasized, the structural strength of the building can be improved by considering the characteristics of the stone, and the optimal allocation of resources in the design process can be realized to better adapt. Building outdoor environment. At the same time, through the scientific use of the slate curtain wall in the appearance design of the building, it can also enhance the artistic expression effect in the application of the design scheme, and the level of its morphological design work can be improved. The relevant contents of different building materials are shown in Table 1.

Table 1 Related content of different building materials

| material type                        | Construction condition                              | price        | Artistic expression                                                          |
|--------------------------------------|-----------------------------------------------------|--------------|------------------------------------------------------------------------------|
| glass                                | Construction is relatively simple                   | fair price   | Significant transparency and simplicity                                      |
| metallic material                    | High construction requirements and reliable quality | Higher price | Bright, rich spatial sense                                                   |
| wood                                 | The construction process is relatively simple       | Higher price | Rustic, natural, simple                                                      |
| Natural stone and slate curtain wall | General construction process and high maturity      | Higher price | Outstanding weight and strength, good building integrity and sculptural feel |

### 3.6 Comprehensive Application of Building Materials Language

The use of materials in architectural design is generally not just a single material application, but also a combination of many different materials, what kind of building is suitable for which material or what material has a specific expressiveness for a particular building. Therefore, in the design of building appearance, designers need to start from the aspects of cost economy, material characteristics, practical application effects, etc., and apply the language of building materials such as space creation, structural system and form change to their appearance design. The building materials language is used to maintain a good aesthetic appearance of the building to meet the diverse needs of people in the visual field.

## 4. Principle of Adaptability of Building Materials in Its External Form Design Application

In order to make building materials have good adaptability in their external shape design and application, and to play the practical role of different building materials, it is necessary to understand the corresponding adaptability principles, and then provide scientific guidance for the construction of building exterior shape material design work. These adaptation principles specifically include: (1) the principle of ecological adaptation. In the process of adapting to the development requirements of the low-carbon economy era and coping with the energy crisis, it is necessary to consider the ecological adaptability principle in the design of exterior form materials, and then realize the combination of circular economy principles of reduction, reuse and recycling. The cost control of the design, the

efficient use of materials, etc., to avoid a greater impact on the ecological environment; (2) to adapt to the principle of regionality. Under the guidance of this principle, the local architectural style can be better reflected in the design of the building exterior form material, and the design cost can be reduced under the action of local materials; (3) Other aspects of the adaptability principle. Under the influence of aesthetic principles, durability and economic principles, and functional principles, it is conducive to highlighting the aesthetic effect of the exterior material design of the building, extending its service life and improving the building service function. In practice, the use of these different adaptive principles in the design of external form materials of a building reduces the cost to 6.3%-7.2%, the economic benefit in the application increases by 7.5%-8.6%, and the design work efficiency is improved by 5.5%-6.7%.

## 5. Conclusion

In summary, the adaptive research work on the application of building materials in the exterior design of buildings has practical reference significance: it is conducive to enhancing the rationality of external design of buildings and enabling different building materials to be used in their design and application. The application of building materials should play its due role and inject vitality into the development of modern architecture. Therefore, in the future, when carrying out the design work of building materials, in order to obtain the ideal material design plan, it is necessary to consider the adaptability of the application of building materials in the external shape design of the building, and scientifically evaluate the effect of the external shape design of the building without the use of building materials. In order to maintain a good application of different building materials in their design. In the long run, it is conducive to the coordinated development of architectural form design and building materials.

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