Research on Current Situation and Development Direction of Civil Engineering Construction Based on Intelligent New Materials

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Abstract. Intelligent new building materials are further improved in the perception level of internal and external environment, as well as the feedback ability of materials themselves. Therefore, it can make further response to the environment while improving the building performance, so it can be widely used in civil engineering construction. Based on this, this paper first studies the classification and function of intelligent new civil building materials, then analyses the structure and composition of intelligent new materials in civil engineering construction, and finally gives the application and development of intelligent new materials in wood engineering construction.

Keywords: Civil Engineering, Construction, Intelligent, Material

1. Introduction

With the iterative expansion of social economy, civil engineering construction has made remarkable expansion and utilization achievements, especially the continuous emergence and rise of various civil engineering infrastructure constructions, which puts forward higher requirements for the construction level and new tech utilization of civil engineering construction [1]. In this context, the construction materials represented by intelligent new materials have also been significantly improved, mainly in the perception level of internal and external environment, as well as the feedback ability of materials themselves, so as to change the nature of materials and make the desired response. The research and tech improvement of intelligent new materials in civil engineering construction can realize the understanding of building state in several aspects as shown in Figure 1, thus establishing technical conditions for the healthy expansion of engineering and civil engineering.

At present, the utilization of intelligent new materials in the field of civil engineering and construction is still in a relatively primary stage, most of the research is still in the theoretical stage, and the results obtained in the practical level are less [2]. It can be said that intelligent new materials have a huge space for improvement and broad utilization prospects. As an important means for human beings to transform the natural environment, civil engineering has become the carrier and platform for the display and progress of new intelligent materials, and has become an important pillar of national economic expansion. However, with the expansion of urbanization, the construction of civil engineering has also brought a series of problems, such as the shortage of land resources, serious...
damage to the ecological environment, traffic congestion and insufficient living space, which have brought adverse effects on the quality of life of residents and the coordinated expansion of economy, society and environment [3]. The focus of civil engineering research is how to avoid the disadvantages of civil engineering.

![Diagram](https://via.placeholder.com/150)

**Figure 1.** Function of intelligent new material in civil engineering construction.

As an important part of civil engineering construction, construction materials are not only the foundation of construction engineering, but also have an important role and impact on the quality and cost of the whole project [4]. As more and more new building materials are applied to civil engineering construction, the quality of construction workers is improved, and the efficiency of the project is also effectively improved. Intelligent new building materials research and expansion speed is very fast, intelligent new materials are constantly used in civil engineering construction, which can effectively save construction costs, reduce losses and protect the ecological environment, and promote the sustainable expansion of civil engineering.

In short, intelligent new materials have great utilization potential in the field of wood and soil engineering construction. The rise and expansion of its utilization not only effectively promotes the improvement of use efficiency and the optimization of structural design forms, but also promotes the innovation and renewal of structural design, construction, maintenance and use control of civil engineering buildings. Therefore, it has important practical value to study the current situation and expansion direction of civil engineering construction based on intelligent new materials.

2. Classification and function of intelligent new civil building materials

2.1. Classification of intelligent new civil construction materials

Intelligent new civil building materials can be divided into building waterproof materials, building thermal insulation materials, building sound absorption and sound insulation materials, building fire prevention materials and building decoration materials according to their functional differences in buildings [5]. These intelligent new-type civil construction materials are not only responsible for some building functions, but also are characterized by functions other than mechanical properties of materials, which endow buildings with functions such as those shown in Figure 2 below, and determine the use functions and building quality of buildings.

![Diagram](https://via.placeholder.com/150)

**Figure 2.** Functional classification of intelligent new civil building materials.
2.2. Function of intelligent new civil building materials
First of all, intelligent new civil building waterproof materials can prevent rainwater, groundwater and other water from invading the building's constituent materials. Therefore, the quality of the material directly affects people's living environment, living conditions and the life of buildings. Secondly, the new intelligent thermal insulation material not only has the function of heat insulation, but also has the effect of heat preservation, so as to prevent the heat exchange between indoor and outdoor. In addition, the new intelligent building sound absorption and insulation materials can absorb the acoustic energy transmitted by the air to a large extent, so as to isolate the sound wave propagation to a large extent. Intelligent information civil building fire-proof materials can not burn or difficult to burn in case of fire, so as to prevent the occurrence and spread of fire, or in case of fire, it can delay the combustion at the initial stage, and win time for the escape and refuge of personnel. In civil engineering, intelligent new civil building decoration materials stick, brush or lay on the internal and external surfaces of buildings, so as to play, beautify, protect, and improve and other decorative functions.

Intelligent new civil construction materials have the sensing function, can detect and identify the stimulus intensity of the internal and external environment, has the driving function, and can respond to the external changes [6]. In addition, it can select, control and respond in a timely manner. When the external stimulus is eliminated, it can quickly return to the original state.

3. Structure of intelligent new material in civil engineering construction

3.1. Concept of intelligent new building materials
In addition, it is able to reflect the internal and external environment changes based on the internal and external characteristics of civil engineering. In addition, intelligent information materials also have certain self-perception and diagnosis functions, which can realize self-regulation and control in the project of interaction with external environment. It can be seen that intelligent information materials can perceive all kinds of information from outside or inside, and can make appropriate response and corresponding action when the external environment or internal state changes. In addition, this type of material organically composes or integrates three kinds of functional materials, such as perception, drive and information, so as to realize the intellectualization of materials.

3.2. Characteristics and structure of new intelligent building materials
Intelligent new building materials integrate sensing, control and driving functions into one. Through their own perception and processing of information, they send out instructions, execute and complete corresponding actions, thus endowing the material system with intelligent functions and biological characteristics such as adaptive environment, so as to enhance structural safety, reduce energy consumption and improve overall performance.

![Figure 3. Structure of new intelligent building materials.](image_url)
The intelligent new material in civil engineering construction is not a single material, but a system composed of multiple material components through organic close composite or strict scientific assembly, as shown in Figure 3 above.

3.3. Composition of new intelligent building materials
Smart materials are composed of different parts, such as matrix materials, sensitive materials, driving materials and information processors. Among them, the matrix material is responsible for the bearing function, so the light material should be selected generally. Sensitive materials are responsible for sensing tasks, and their main role is to perceive environmental changes. Driving materials are responsible for response and control tasks, such as functional materials, conductive materials, magnetic materials, and optical fiber and semiconductor materials. The action flow chart of intelligent structure is shown in Figure 4.

![Figure 4. The action flow chart of intelligent structure.](image)

4. Utilization and expansion of intelligent new materials in civil engineering construction

4.1. Utilization in civil engineering construction
First of all, in the utilization of building concrete, intelligent new materials can sense cracks in concrete and corrosion of steel bars, and can automatically bond cracks in concrete or prevent corrosion of steel bars. The fiber for bonding cracks is a kind of porous hollow fiber made of glass fiber and polypropylene. When it is mixed into concrete, it will release some chemical substances to fill and bond the cracks in concrete when the concrete is excessively flexed. Secondly, in the utilization level of building multi-functional brick, it has flexibility and intelligence. It is mainly composed of functional layer, communication layer, conveying channel and mask, and the function layer can feel the output of the surrounding energy. The communication layer establishes a channel to communicate with the environment. The transport layer can transport material exchange, and the mask layer is to respond to the perception of the external environment.

4.2. Expansion direction of intelligent new materials in civil engineering construction
With the deepening of the research and utilization of new materials in architecture and other fields, it is urgent to integrate them. In the future, intelligent civil engineering building materials will further integrate automation control tech, computer science, material science and many other specialties and disciplines to realize the energy-saving, intensive, intelligent and environmental protection expansion of civil engineering buildings. In addition, the future utilization of intelligent new materials will not only focus on the improvement of building performance, but also further promote the structural detection, self-safety diagnosis and healing of materials.

The utilization of intelligent materials in civil engineering construction will further focus on solving the durability problems, measuring the dynamic strain of the structure, the fatigue problem of optical fiber, and the micro mechanical problems of material interface, so as to realize the healthy and sustainable expansion of civil engineering construction.
5. Conclusion
In summary, the utilization of new building materials in civil engineering construction can not only improve the quality of construction workers, but also effectively improve the engineering efficiency. In addition, the utilization of this material can effectively save the construction cost, reduce the loss and protect the ecological environment, and promote the sustainable expansion of civil engineering. This paper analyzes the classification and function of new intelligent civil construction materials. Through the analysis of the structure and composition of intelligent new materials in civil engineering construction, the characteristics and structure of intelligent new building materials are studied. Through the research on the utilization and expansion of intelligent new materials in civil engineering construction, the utilization and expansion direction in civil engineering construction are analyzed.

Acknowledgment
Science and technology research project of Chongqing Education Commission (KJQN202004302)“Research on Water Resistance and Strength Performance of Large Volume Cement-Desulfurized Gypsum Composite Cement System”.

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