Taking basalt as an example to discuss the application and development of green building materials

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Abstract. The development of green building materials has great significance to our country. In the case of saving materials and money, it can also play the role of environmental protection, which has far-reaching significance for ecological development and sustainable use. The development of green materials in China is also developing rapidly, the present situation and development prospect of green materials in China are studied. This paper starts with continuous basalt. Discusses the green environmental protection building materials present application and the development. In this paper, I will take the basalt fiber seal test of No.03 provincial road in Zhejiang Province as an example to discuss the current innovative technology and application of continuous basalt in China.

1. Introduction
This paper starts with continuous basalt. Discusses the green environmental protection building materials present application and the development. Use of green building materials can improve the work efficiency of civil engineering, shorten the construction period, the construction workers working in the same time to achieve higher working efficiency. For the environment is more friendly, more in line with the international trend of green environmental protection.

2. Research background of green building materials
At present, it is more important to continuously optimize the industrial structure and energy structure. So that it can accelerate the transformation of building materials to low energy consumption and green environmental protection. It also provides technology, funds, policies and other means to provide a new way of innovation and development for green building, to increase the research and development of green building materials and fundamentally change green building. Green buildings not only save energy consumption, but also provide a good pillar for the sustainable development of the environment and energy cycle. Countries around the world are advocating green environmental protection and integrate the concept of green environmental protection into the development of the construction industry. So that it can be long-term development and can be widely recognized. Green building materials is referring to the building materials production and clean production technology, no or less of the use of natural resources and energy. Among them with continuous basalt fiber as an example, its production process is harmless to the environment. There are no harmful emissions from melting, with automatic degradation, sustainable recycling and other green environmental protection. It is beneficial to environmental protection and human health.
3. The application of green building materials in China

In today’s green buildings, most of it is people's experimental research on emerging material technologies. Try to explore environmental protection, energy conservation, sustainable, friendly and practical building materials for both human and environment. Under the condition of China's rapid economic development, China's new building materials will make breakthroughs in the aspects of ecology and intelligence, and reduce water pollution, chemical pollution, noise pollution and radioactive pollution as much as possible.

At the same time, new building materials will also be combined with the modern intelligent household and high-tech computer intelligent application system. To adjust in the intelligent building and comfort, make more in line with the modern city building characteristics. Compared with traditional construction materials, the application of new building materials to make its strength increased, Energy-saving, reduction in weight. Make this function more powerful, more conforms to our country. In the research of related properties, the mechanical properties, durability and corrosion resistance of new building materials have been greatly improved.

In the production process, make full use of the production of raw materials. Adopt new process and new technology to improve the performance of the material. Furthermore, at the same time of developing new building materials and green building materials, to comprehensively consider our country's sustainable development road, reduce material consumption, to reduce energy consumption and reduce pollution consumption. It will make major breakthroughs in performance, use, function and safety and comfort. Cooperate with the modernization of high-grade buildings matching and standardization development, it integrates micro-electronic technology and high-tech production technology, realizes the regulation and improvement of new building materials, and makes building materials more in line with the world development trend and human survival needs.

4. Properties and applications of continuous basalt

4.1 Environmental performance of continuous basalt fiber

Continuous basalt fiber (CBF) is basalt magma cools by volcanic eruption frozen a compact shape or foamy structure rock. The schematic diagram of basalt is shown in Figure 1. Basalt resources are rich in our country, have a wide distribution, and have a stable source of raw materials. In recent years, Basalt fiber in China developed rapidly belongs to the world's most advanced basalt fiber production technology of one of several countries.

Continuous basalt fiber (CBF) is a kind of inorganic fiber, which takes basalt as raw material and does not need any additives in the kiln (1450~1500) after high temperature melting and rapid drawing into the continuous fiber, basalt melting without harmful gas exclusion, continuous basalt fiber production process is environmentally friendly. The chemical composition of basalts is shown in Table 1. It is a new environmental protection fiber in the 21st century.

| Table 1. Chemical composition of basalt |
|----------------------------------------|
| SiO<sub>2</sub> | Al<sub>2</sub>O<sub>3</sub> | Fe O | Fe<sub>2</sub>O<sub>3</sub> | Ca O | Mg O | Na<sub>2</sub>O | K<sub>2</sub>O | Others |
| 45.5 | 15.2 | 9.45 | 9.35 | 7.8 | 9.4 | 1.75 | 0.7 | 0.85 |
4.2 The properties of continuous basalt

4.2.1 Electric properties
Continuous basalt fiber than volume resistivity an order of magnitude higher than glass fiber. Basalt containing conductive oxide material scores less than 20%. The tangent of the dielectric loss Angle of continuous basalt fiber after infiltration treatment is 50% lower than that of glass fiber. Continuous basalt fiber can be used as a new type of thermal dielectric material, High voltage insulation materials, antenna fairing, etc.

4.2.2 Chemical stability
Continuous basalt fiber (CBF) shows the ability to resist the erosion of media such as water, acid and alkali. The mass loss and strength loss before and after erosion by the medium are usually taken into account. It has good chemical stability in acid and alkaline solution, and its acid and alkali resistance is better than that of aluminum borosilicate fiber. There is a very low dilution rate of 0.2%–0.3%. moisture absorption does not change with time. To ensure that the use of thermal stability and water resistance is better than glass fiber.

4.3 The application of continuous basalt

4.3.1 Application in the field of building materials
Although the structural strengthening effect may be less than that of carbon fiber or glass fiber. But basalt fiber can still be used as a reinforcement material for concrete structures. Especially when moderate structural strengthening and high fire resistance are sought at the same time. Such as building structures, Basalt fiber strengthening will become a good alternative method in FRP strengthening system.

Basalt fiber unidirectional cloth is mainly used for reinforcing and repairing bridge structures, and is often used to reinforce embankments and hydro-power DAMS. Also can use for strengthen the foundation of expressways and overpasses. Studies have shown that after adding 1.0% shorted fiber, The compressive strength and splitting tensile strength of concrete are reduced respectively 26.4% and 12%. But the bearing capacity and fracture toughness are enhanced, before the failure there is a higher ultimate bearing capacity and deflection of continuous. Continuous basalt fiber concrete (CFRC) is widely used in the engineering which is often subjected to impact load, such as the pool, the airport runway, the water treatment plant and the expressway. in projects often subjected to impact loads such as airport runways and expressways. At present, continuous basalt has occupied more and more important position in the material market, and its application field is gradually expanding.

4.3.2 Automotive applications, electronic technology applications
Using continuous basalt can greatly strengthen the portability of the car, reduce energy consumption,
and its performance can be improved effectively. Basalt fiber can be used in automotive soft instrument panel skeleton basalt fiber in automotive front bracket, automobile door module, automobile body, automobile spring, automobile muffler material, automobile friction reinforcement material, etc. In electronic technology, continuous basalt fiber can be used as reinforcement material for wind force generating blade. Continuous basalt fiber can completely replace carbon fiber in this field, and its comprehensive performance makes it have a good application prospect in the field of electrical insulation as a reinforcing fiber. In some cases, the addition of continuous basalt can greatly improve the transmission performance.

4.4 Continuous basalt engineering examples

4.4.1 Fiber sealing technology

Fiber sealing technology originated from the United Kingdom and was first introduced to China in 2007. The reinforced fiber used is glass fiber. Basalt fiber sealing test section of 03 provincial road in Zhejiang province. Application of continuous basalt fiber in sealing technology of highway maintenance fiber. Fiber sealing is the simultaneous application of asphalt and fiberglass in one device. It is a new process in which aggregate is then spread over it to form a new wear layer or stress absorption intermediate layer. It can effectively prevent the cracks on the original surface layer or roadbed cracks from reflecting to the overlying layer. Is the world's asphalt pavement maintenance and construction of revolutionary new technology? Compared with glass fiber, basalt fiber has obvious advantages in performance.

4.4.2 Main advantages of fibre sealing technology

To prevent reflection cracking, block the disease of sub-grade surface interconnection and improve pavement waterproof performance. It also has good stress absorption and dispersion effect. Fiber seal technology application scope: new or old asphalt pavement laid wear-resisting layer, new inter-layer bonding stress absorption layer on sub-grade surface, each grade highway under seal layer construction, old cement road surface reconstruction, the construction of the bridge deck waterproof layer.

4.4.3 Continuous basalt was applied in the project

Through the application of fiber sealing layer of road maintenance from Fujian to Hangzhou and Datang of Zhejiang province 03 province road. The results show that basalt fiber has better compatibility, water resistance, wear resistance and stability than glass fiber, and the disperse performance completely meets the construction requirements. Compared with glass fiber, basalt fiber material has obvious advantages in property in road maintenance fiber sealing engineering.

The use of continuous basalt can improve the work efficiency of civil engineering, shorten the construction period, make the construction workers working in the same time to achieve higher working efficiency. For the environment is more friendly and more in line with the international trend of green environmental protection.

5. Prospect of green building materials

With the development of social economy, the quality of people's life has been greatly improved, and the way of life has become more efficient. Resulting in changes in people's concept of survival and life. At present, people tend to pursue a more environmentally friendly and healthy living environment, so in this case, the promotion of green building materials is just pushing the boat along with the current. It can meet people's demand for green living without increasing the original construction budget. The development prospect of green building materials can be seen in the following points.

5.1. Green design theory

In fact, green materials, healthy materials and environmentally friendly materials are all design concepts based on the concept of sustainable development. These concepts are being accepted by more and more architects, and are also becoming common in university textbooks and various media. And consumers
seem to prefer products linked with new concepts Compared with traditional building materials, green building materials take into account the optimization of the ecological environment without affecting the price and use function.

5.2. Sustainable global development trends
With the rapid development of world economy and population growth, human demand for resources is endless, but the resource is limited and is gradually reduced. Rising carbon emissions have serious consequences for the global climate. If we continue to use traditional building materials and methods, the future of mankind will suffer from endless problems. Green building materials conform to the green, low-carbon, circular and sustainable way of production and life, only by using green building materials can we meet the needs of contemporary people without affecting the living needs of future generations.

5.3. Application of green building materials in engineering
With green environmental protection concept deeply rooted in the hearts of the people, people have become to the requirement of building with different before. In the pursuit of living feeling good cases, people are more care about the structure of the comprehensive performance. In the evaluation standards, environmental protection and energy saving, etc. about the green construction assessment criteria were weighted proportion of increase. In addition, under the continuous implementation of the concept of green development by the state, all industries are changing flexibly.

6. Conclusion
With the development of our country's economy, how to ensure green and sustainable development under the premise of rapid economic development is the problem that our country is facing. Not just in China, the global trend of building development tends to ensure the aesthetics, economic budget and construction schedule under the premise of vigorously developing green environmental protection. Therefore make the earth resources can sustainable development. The application and development of continuous basalt and other related green building materials reflects that China has vigorously developed and innovated environment-friendly green materials, and to provide policy support, formulate relevant regulations, so that green building in the premise of available materials to develop rapidly.

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