

## **Use of modern concrete substitutes in construction and architecture**

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### **I. INTRODUCTION**

Concrete is a versatile building material that is used in virtually all construction industries. The most common use of concrete for the manufacture of enclosures and load-bearing structures in civil and industrial construction. Monolithic construction of homes is becoming more widely used. Concrete is used for architectural expressiveness of buildings, elements of small and landscape architecture with the use of white and colored cements, decorative fillers and various surface treatments. Concretes are widely used in road and airfield construction.

But there are drawbacks to the material: metal reinforcement creates electric fields inside the concrete that have a bad effect on human health; concrete production pollutes the atmosphere; early crack formation in the elongated and rapid opening; great weight. This encourages professionals to look for other materials that could replace concrete in various aspects of construction.

### **II. MAIN PART**

Today there is a huge variety of cutting-edge building materials. Innovators seek to improve the quality of concrete.

#### **1. Straw bales**

The construction of straw bales can be heard back in the days when homes were built with natural, local materials. Straw bales are used to create the walls of the house inside the frame, replacing other building materials such as concrete, wood, plaster, fiberglass or stone. When properly sealed, straw bales naturally provide a very high level of thermal insulation for hot or cold climates, and are not only affordable but also sustainable since straw is a rapidly renewable resource.

#### **2. HempCrete**

HempCrete is just what it sounds like – a concrete like material created from the woody inner fibers of the hemp plant. The hemp fibers are bound with lime to create concrete-like shapes that are strong and light. HempCrete blocks are super-lightweight, which can also dramatically reduce the energy used to transport the blocks, and hemp itself is a fast-growing, renewable resource.

#### **3. Recycled plastic**

Recycled plastic is a concrete substitute that includes grounded recycled plastic and debris that not only reduces greenhouse gas emissions but also reduces weight and provides new uses for plastic waste.

#### **4. Wood**

Conventional old wood still retains many advantages over more industrial building materials such as concrete or steel. Not only do trees absorb CO<sub>2</sub> as they grow, they need far less energy-intensive methods for processing into construction products. Properly managed forests are also renewable and can provide a diverse biodiversity.

### **5. Mycelium**

Mycelium is a futuristic building material that is absolutely natural - it incorporates the root structure of fungi. It can be grown around other natural materials, such as ground straw, in molds, and then air-dried to create lightweight and durable bricks or other shapes.

### **6. Ferrock**

Ferrock is a new material being researched that uses recycled materials including steel dust from the steel industry to create a concrete-like building material that is even stronger than concrete. What's more, this unique material actually absorbs and traps carbon dioxide as part of its drying and hardening process – making it not only less CO<sub>2</sub> intensive than traditional concrete, but actually carbon neutral.

### **7. AshCrete**

AshCrete is a specific alternative that uses ash moss instead of traditional cement. By using ash, a by-product of burning coal. Recycled material can replace 97 percent of traditional concrete components.

### **8. Lumber**

Wood Concrete is an interesting building material made of sawdust and concrete mixed with each other. It is lighter than concrete, which is important in transportation, and the sawdust also uses waste and replaces some energy-intensive components of traditional concrete.

### **9. Bamboo**

Bamboo might seem trendy, but it has actually been a locally-sourced building material in some regions of the world for millennia. What makes bamboo such a promising building material for modern buildings is its combination of tensile strength, light weight, and fast-growing renewable nature. Used for framing buildings and shelters, bamboo can replace expensive and heavy imported materials and provide an alternative to concrete and rebar construction, especially in difficult-to reach areas, post-disaster rebuilding, and low-income areas with access to natural locally-sourced bamboo.

## **III. CONCLUSION**

The modern market is constantly replenished with new developments of concrete substitutes, which help to facilitate the work and improve the quality of houses. But using substitutes can be costly. Therefore, the benefit is observed when the use of analogues allows you to achieve those properties of concrete that are necessary when carrying out certain works.

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