ECOLOGICAL CONSTRUCTION MATERIALS

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Abstract *In recent years, the construction industry has seen an increase in demand for sustainable building materials, which in turn will enable zero-emission structures. Various materials such as cork, coffe husk, newspaper wood, mycellium, recycled diapers, plastic bricks and seaweed. Various materials such as cork, coffee husk, newspaper wood, mycelium, recycled diapers, plastic bricks and seaweed have been introduced to the construction field. The use of such unconventional materials makes the groundwork for innovation and progress in construction materials technology.*

Key words: *biodegradable**,** eco-friendly, natural, ecological, building materials*

Introduction

Concrete and steel production annually emits tons of greenhouse gases and waste so much that it has become a serious problem for the environment and poses a threat to global warming. Fortunately, there are some solutions to this problem, which include the use of more environmentally friendly and sustainable materials. Innovations in the choice of building materials will greatly change the way we build and maintain our homes.

1. Cork

Cork is used primarily as caps for bottles of wine and other beverages and is not a building material. However, it is actually a very environmentally friendly and easy-to-manufacture material that emits almost no gases and CO2. This house (Fig.1; Fig.2) in Eton, the UK, is the first house built entirely of cork. The roof and walls are interconnected cork building blocks. This sustainable architecture does not require any glue or other artificial materials, which makes it absolutely environmentally friendly. It was also a "House of the Year" nominee.

Figura 1. Cork House

Figura 2. Cork House

2. Coffee Husk

Coffee husk (Fig.3) is a byproduct of coffee beans. By combining recycled polycarbonate and coffee husk, people learned to manufacture cheap, light and easy-to-transport building blocks that may easily be assembled on a steel frame in order to build houses that is pest and moist resistant at a quite law price of only 5000$. The Colombian company Woodpecker SAS is a well-known manufacturer of this type of structure. The company has built more than 3,000 houses of this type,

designed for rural areas, and still produces and supplies cheap and environmentally friendly building materials in the construction industry. (Fig.4)

Figura 4. Coffee Husk House

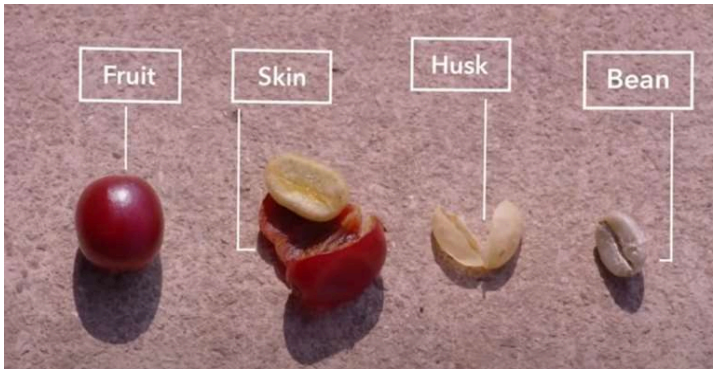

Figura 3. Coffee Husk production

3. Mycelium

Mycelium or, in other words, the white threads of the fungus can be an excellent building material. The mushroom brick (Fig. 5) is made using a rather interesting process. The process begins with the collection of small mushroom samples, which are eventually grown in specialized laboratories. Next, the mycelium is placed in a mold and allowed to grow a little more so that it gains structural strength. Finally, the material is removed from the mold and baked for a few minutes to stop growth. This process can take up to four weeks and is very complex. Such brick is very light, heat-resistant and completely biodegradable. At the moment, the mycelium is being investigated for the possibility of obtaining mycelium bricks in large quantities. If the mycelium harvesting process is optimized, the applications of this building material will be limitless. Several buildings of this material have already been built and are in use. One of them is in Queens, New York.

Figura 5. Mycelium briks

Figura 6. Mycelium brik house

4. Newspaper Wood

Newspaper wood is exactly what you imagine. NewspaperWood reverses a traditional production process: not from wood to paper, but from (news)paper to wood. When a NewspaperWood log is cut, the layers of paper appear like wood grain or growth rings of a tree and therefore resemble the aesthetics of real wood. The wood is made from sheets of recycled newspaper which are glued together in layers. NewspaperWood is the result of a 2003 project led by Design Academy Eindhoven graduate Mieke Meijer. The project was aimed at making different objects from processed paper such as furniture items (Fig.9), concept car interior (Fig.8), watch faces (Fig.7), etc. The project's concept was not the replacement for natural wood. Its purpose was to provide an alternative for certain types of wood products that may significantly reduce wood cutting.

Figura 7.
NW Wach face

Figura 8.
NW concept car interior

Figura 9.
NW furniture item

5. Hempcrete

Hempcrete (Fig.10; Fig.11) is a biocomposite, construction and insulation material. It is made by combining woody hemps with lime in order to create a light and eco-friendly material. The hemp has a high silica content allowing it to bond well with the lime. It cannot serve as the main structure of a building, but it can be built around a steel frame, timber or concrete. It is used for the restoration and building of all kinds of constructions. The Hempcrete is fire, crack, mold and pest resistant. It also regulates moisture and is a great solution for regions with high seismic activity.

Figura 10. Hempcrete blocks

Figura 11. Hempcrete blocks

Conclusions

Construction Material Technology is developing and evolving at an unbelievable pace. The new technology offers solutions for sustainable, carbon-emissions free and ecological living without any downsides. The development of new building materials will inevitably change the way we design, build and live.

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