

Textiles as Structural Element for the Reinforcement of Concrete



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Our modern-day technologies require materials bearing unusual combination of properties which cannot be present in conventional materials such as metal, ceramics and polymeric materials. It is especially evident with materials in use for construction applications. Composite materials are emerging as realistic alternatives to the metal alloys in many applications like construction, automobiles, marine, aerospace applications, sports goods, etc.

Composites are combination of different materials leading to a new material and are often used in civil engineering. The reason behind use of composites is the scarcity of plain material with regard to structural and economic performance. Thus, it is necessary to combine the advantageous properties of single materials, which provide the benefits of load-bearing capacity, durability, weight and costs, along with elimination of draw backs inherent to single traditional construction materials.

One such material is Textile Reinforced Concrete (TRC). This is made by using non-corrosive textile materials as reinforcement with fine grained concrete matrix. All kinds of fibrous materials, found in the nature, and mostly go waste, can be used in making this TRC. Because of fibrous strength in the mixture of concrete materials, the micro crack formation in the construction materials are minimized, or rather eliminated, while increasing the lightness, As this has high strength-to-weight ratio, ease of handling, speed of installation, and visual impact, reversibility etc. TRC, is gaining popularity within the civil construction sector. Applications like fiber-reinforced concrete, concrete retrofitting, concrete jacketing and internal and external reinforcement of composite concrete structures play an important role.

In ancient times, prehistoric man created and used composite materials. They made and used straw-reinforced clay for bricks in construction and structures as well as pottery. The concept of using fibers to improve the characteristics of construction materials is very old. Historically, horse hair were used in mortar and straw in mud bricks. Asbestos fibers were used in concrete in 1900. In the 1950s, fiber-reinforced concrete gained popularity as concept of composite materials evolved. As soon as the health risks associated with asbestos were found, an urge to find a replacement for building materials was felt and raised. By the 1960s, materials for reinforcement of concrete were Glass, Steel and Synthetic fibers such as Polypropylene.

The researches on TRC have revealed many promising attributes, some of which are mentioned above, would expectedly become a very attractive construction material. In Pakistan, more attention may be given to use of such reinforced materials, in these days of rising cost of construction, to make houses long sustainable and economical.

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