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Steel Fiber: Prevailing Stability of Construction

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Concrete is chiefly used for construction purpose all over the world. A stumbling block of concrete is that it is not able to preserve its tensile strength and get cracking down due to architectural and environmental aspects which inflict us to design a new method to revamp durability of concrete. Conventional concrete loses its tensile resistance after the formation of diverse cracks. By using steel fiber, it is now feasible to conquer this drawback of concrete. In steel fiber reinforced concrete (SFRC), numerous small steel fibers are distributed throughout in concrete during the mixing. The notion of mixing small fibers to concrete is to increase the tensile strength and resist towards cracks. When conventional concrete is reinforced with steel fibers, significant improvements are observed in compressive strength, tensile strength, flexural strength and impact-resistance of concrete, accompanied by a marked improvement in ductility, optimum fiber-volume fraction and aspect-ratio of steel fibers is identified[1]. Among other factors, the increased ductility of SFRC compared to that of conventional concrete is caused by redistribution of stresses by the fibers bridging the cracks. Nowadays, steel fibers are widely used as the main and unique reinforcing for industrial floor slabs, shotcrete and prefabricated concrete products. They are also considered for structural purposes in reinforcement of slabs on piles, sea-defense walls and blocks, blast-resistant storage cabins, concrete basements, foundation slabs and shear reinforcement in pre-stressed elements[2]. Steel fibers dwindle the permeability and water migration in concrete, which ensures protection of concrete due to the detrimental effects of moisture[3]. There are various nano-particles which are also used to increase the durability and tensile strength of concrete e.g. nano-SiO_2 [4]. The contribution of steel fiber helps to boost the fracture properties of High Performance Concrete (HPC) containing nano-SiO_2 and fly ash only when its content fiber is below 2% [5]. So, steel fibers have an enormous advantage, besides it has few pitfalls which are also considerable. It is a very expensive material, only 1% steel fiber inclusion will roughly double the material costs of the concrete. Some study also showed that with the addition of short steel fibers, brittle concrete tends to become ductile and its toughness is correspondingly improved, however

no significant increase is observed in compressive strength[6]. When the mechanical properties were tested, it was found that a linear decay in mechanical properties with the increase in temperature confirming that such fiber addition does not significantly influence fire resistance in uniaxial compression[7]. It is also found that the mechanical properties of concrete can be increased by using nano-steel fibers reinforced concrete (NSFC) [8]. The noteworthy properties of steel fibers made it very easy for us to construct many things with longer life.

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