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RATIONAL WAYS TO USE FIBER CONCRETE

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During the analysis, the most rational areas of application of fiber-reinforced concrete and the influence of various fibers on the physico-mechanical characteristics of concrete were identified. The positive effect of dispersed concrete reinforcement on their performance is described.

Nowadays, the use of a new generation of reinforced concrete is developing. Fiber concrete is a new type of concrete with interspersed fibers throughout the volume. Depending on the origin, the fibers are divided into three types: fiberglass, steel and synthetic fibers.

In the course of studying the material in [1], the most rational areas of application of fiber-reinforced concrete were revealed, such as prefabricated elements and structures: pipelines, beams, railway sleepers, floating dock modules, explosion-proof structures, piles, heating elements, street fittings, etc. and also monolithic structures, floors of industrial buildings, defense structures, roads, water dams, irrigation canals, etc. These designs are widely used abroad and have proven their effectiveness. Fiber reinforcement increases the ratio of tensile strengths during compression and tension, which leads to increased concrete efficiency.

In the work of Sofienko N.V., Pelyarchuk N.N. and Popova O.N. [2] the use of fiber-reinforced concrete as a promising material in construction was examined. According to its characteristics, fiber-reinforced concrete is suitable for the construction of structures subject to dynamic loads and thin-walled structures with great durability. The achievement of the economic effect is due to a change in the technology of obtaining and erecting structures from fiber-reinforced concrete and its new properties. The use of fiber-reinforced concrete increases the service life of structures, which leads to a reduction in the cost of their operation during the life of the structure.

In the article Durachenko A.V. [3] examined the use of fiber-reinforced concrete in the construction of Russia. Steel fiber concrete has been widely used in the construction of runways and roads, their difference in increased resistance to pulsating loads, abrasion and atmospheric influences. Fiber concrete is also used in industrial and civil engineering. Enclosing elements, floors, walls, partitions, coatings, pipes, channels and many others are made from it. The economic effect is achieved due to greater wear resistance, durability, serviceability and increased safety during seismic activity.

In [4], the effect of basalt fiber on the physico-mechanical characteristics of self-compacting concrete is studied. After 28 days, self-compacting fiber-reinforced concrete gains strength of 104.5 MPa, Poisson's ratio of 0.17, elastic modulus of 63.9 GPa, and water absorption of 2.2%. The indicators of these characteristics make it possible to use them in high-level resource-saving construction, the construction of nuclear power plants, reservoirs, bridges, tunnels, offshore structures, runways, aerodrome coatings, launch complexes for space ships and other special structures.

The work [5] describes the use of fiberglass concrete for building decoration. Technological properties make it possible to give fiberglass concrete almost any shape, geometry, texture and relief. Its plasticity and lightness allow architects to embody any ideas. When using concrete with the addition of glass fiber for decorative finishes, you can not worry about the increased load on the foundation, due to the lightness of the thin-walled composite material. The disadvantage of this building material is its cost, but, here we have the reduction in the cost of strengthening the bearing walls and foundations, so the high cost is unproven.

Lesovik V.S. in article [6] examines the use of fiber-reinforced concrete in seismically active areas. Most of all in the world Arabic countries are affected by seismic activity, for them, along with the effectiveness of construction, is its cost. The use of fiber-reinforced concrete increases plasticity during compression and tension, shear resistance increases, without special detailing of seismic resistance, adequate resistance to deformation of the potential and damage to tolerance can be achieved. In this case, it is possible not to accept special details for the earthquake resistance of structures and buildings, which is an economic factor. It also makes it possible to reconstruct buildings that were built without seismic adaptability.

Gafarova in the article [7] describes the use of various types of fiber. The physico-mechanical characteristics of fiber-reinforced concrete depend on the type of fiber. Polypropylene and nylon fibers have a low modulus of elasticity, which does not provide a qualitative increase in the strength of concrete. Due to the fact, that poly-

propylene fiber is not subjected to corrosion, it has found application in the construction of hydraulic structures, bulk floors, offshore structures. Environmental friendliness, heat resistance, durability are characteristic for basalt fiber. Concrete with basalt fiber has high physical and mechanical characteristics: tensile strength, heat resistance, durability, low creep, high crack resistance, etc. Also for fiber-reinforced concrete, fiberglass is common. It reduces the cost of concrete and improves operational and technical characteristics. Steel fiber is the most effective. Concrete with the addition of steel fibers increases the compressive and bending strength, has high impact resistance, crack resistance and low brittleness, which is a consequence of increasing the resistance of concrete in all directions.

In [8], the study is devoted to the influence of various fibers on the characteristics of fiber concrete. In industrial construction, steel fiber reinforced concrete is more often used, since when it is used, the coating thickness is reduced by 40-50% without loss of strength and performance characteristics in comparison with ordinary concrete. The use of steel fiber leads to an increase in ductility, frost resistance and bearing capacity. Fiberglass concrete has been widely used, since glass fibers are not subjected to corrosion. The disadvantage of glass fibers is low alkali resistance, which leads to the possibility of using glass fiber only in chemically inert environments. Seclofibroconcrete is very plastic and does not lose its strength characteristics when stained. Basalt fiber has high physico-mechanical properties, chemical resistance and weather resistance, which is also environmentally friendly. The use of basalt fiber reduces shrinkage cracks and increases the technical and economic indicators of the structure as a whole.

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