UDC 691.322.7

ANALYSIS OF THE DEVELOPMENT LEVEL OF FIBER CONCRETE AND ITS PROSPECTS

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The article analyzes the publications of authors who have made a great contribution to the development and study of fiber-reinforced concrete. The analysis carried out gives a clear definition of the concept of fiber-reinforced concrete and describes the main types of fibers used. Other measures are being considered to achieve high compressive strength and flexural tensile strengths.

From the article by S.I.Suhova, fiber-reinforced concrete is concrete in which special inclusions, called fibers, are distributed throughout the structure [1]. Fiber-reinforced concrete is many times greater than the strength characteristics of conventional concrete. Reinforced concrete is divided into several types. The most commonly used materials are steel, synthetic materials and fiberglass. The main indicators of the properties of fiber-reinforced concrete are: compressive strength, axial tensile strength, flexural tensile strength, frost resistance, water resistance, impact strength, toughness. The most important of these are tensile strength and impact strength 3-5 times higher than that of conventional concrete. The most rational areas of application of fiber-reinforced concrete: highways, pavement re-laying, industrial floors, railway sleepers, pipelines, beams, steps. For the manufacture of fibers, fibers with a wire diameter of 0.2 mm to 1.0 mm are used. The used fiber, cut from a thin cold-rolled sheet, has a thickness of 0.3 to 1.0 mm, a width of 0.4x0.6 mm and a length of 30 to 40 mm. The strength of this fiber is from 480 to 600 MPa. The cheapest and most chemically resistant fiber is made from synthetic fibers. However, this type of fiber has a low modulus of elasticity and high ultimate deformability. Synthetic fiber is used in construction, often in fine-grained concrete due to its accelerated strength development.

After analyzing the article by SV Klyuev, it was found that there are many varieties of fiber-reinforced concrete products that have a wide range of applications [2]. From the point of view of saving materials, fiber-reinforced concrete with the addition of polypropylene fibers is used for highways due to the reduction in the thickness of the coating. This is primarily due to the fact that this material has shown its strength, lightness and high viscosity. When assessing the quality and studying the physical and mechanical properties of aggregates, it was found that the dispersed reinforcement of the cement matrix with polypropylene fiber, which has a high chemical resistance to an alkaline medium, increases the compressive strength to 13%, and the flexural strength to 38%. Therefore, the use of polypropylene fiber is more effective in increasing the flexural tensile strength of fine-grained concrete.

In the article by R.V. Lesovik, it is said that steel-fiber concrete is mainly used abroad in three directions, such as aerodrome coatings, sprayed concrete and monolithic tunnels, bank protection and berthing structures [3]. Steel-fiber concrete is widely used for repair work, industrial buildings, flooring, and thin-walled load-bearing structures. The advantages of using this material in the construction of busy industrial buildings, warehouses with a high specific static and dynamic load: reducing the thickness of the floors, partial replacement of traditional reinforcement, high wear resistance, impact strength, and reduced labor intensity. This material is good for the construction of aerodrome pavements as it provides a thickness reduction of 40-50% without loss of bearing properties. When steel fiber is added to fine-grained concrete, the compressive strength increases by 28% and the modulus of elasticity by 27%.

However, an increase in the strength of fine-grained concrete is associated only with the use of fiber, but only with the use of complex measures in production.

Auto publications, S.V. Klyuev argues that due to large-sized equipment and storage of materials in industrial buildings and structures, there is a need for development in the field of concrete for heavy-duty floors [4]. For this purpose, for fine-grained concrete with increased operational characteristics, high-density packing of aggregate is used, such as screening of granite crushing and hyperplasticizer, as well as fiber reinforcement. Thanks to the research, it became clear that the developed composition of fine-grained concrete with high-density aggregate packing on a composite binder exceeds the strength of concrete without a high-density aggregate by 3 times. Due to the high-quality packing of aggregate particles and structure. For heavily loaded floors, fiber-reinforced concrete with aggregate from granite screening and sand with a size modulus of 1.2 a are used as a binder TMC-100, VNV-100 and Portland cement CEM I 42.5N. When using a plasticizer, concrete is obtained with a high-density aggregate packing. Using a composite binder, hyperplasticizer Muraplast FK 68, metal wave-like fiber, compositions of finely dispersed fiber-reinforced concrete were obtained on screening granite crushing with a compressive strength of 118.8 MPa, and a bending strength of 14.1 MPa.

The analysis of publications has shown that fiber-reinforced concrete is a modern building material with a fairly wide range of applications. The fibers can be various materials by their nature, as well as various production wastes. In addition, in order to achieve the best result of strength readings, a number of measures should be used, associated not only with the correct selection of fiber and its characteristics, but also with the selection of an aggregate to create a dense matrix of the resulting material.

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