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## **PROSPECTS OF USING CARBON FIBERS IN COMPOSITE MIXTURES FOR FDM PRINTING**

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According to [1], carbon fiber is a composite material consisting of thin threads with a diameter of 5 to 15  $\mu\text{m}$ , which are formed mainly by carbon atoms. Carbon atoms are combined into microscopic crystals that are aligned parallel to each other. Crystal alignment gives the fiber greater tensile strength.

Carbon fiber is characterized by: high elasticity and mechanical strength; good dimensional stability; increased rigidity; lightness; resistance to high temperatures, chemical reagents and ultraviolet radiation.

Among the disadvantages of the fiber, we can highlight: very low resistance to shock loads; decrease in viscosity during printing, which leads to the appearance of a "cobweb"; the hardness and abrasiveness of the material leads to faster wear of the extruder nozzle of the 3D printer; gives the composite filament made on the basis of polymers brittleness, which can be eliminated by using them in a composite mixture for 3D printing.

Carbon fibers with unique physico-chemical and mechanical properties lead to a wide range of their use from the aviation and space industry to the production of water filters; from engineering, where they are used to shield electrical equipment, to the manufacture of offshore drilling platforms and medicine.

The object of further research will be composite materials based on PLA polymer powder (90%) and crushed carbon fibers (10%) as a composite mixture for power 3D printer for manufacturing finished products by FDM 3D printing method.

Excellent interlayer adhesion as well as minimal deformation make this composite material ideal for 3D printing of precision parts.

### References

1. V.I. A straw . The use of carbon fiber as external reinforcement to increase the load capacity of reinforced concrete span structures of railway bridges. Bridges and tunnels: theory, research, practice, 2015, No. 8. - P.101-107.