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ADDITIVE TECHNOLOGIES IN ENGINE-BUILDING

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With the development of science and technology, many technical fields have been able to improve the quality of production and reduce labor effort through the use of various devices and machines. The field of engine-building also needs special equipment to create complex parts of mechanisms. To date, due to the development of 3D-modeling and -printing, it has become possible to simplify the production process of engines as a whole or their individual components. There are already such devices that make parts from durable materials, so the production of engines using additive technologies is an highly important process, since it greatly simplifies the work of a person who creating complex structures.

The purpose of this work is to introduce the concept of «additive technology», describe its advantages and disadvantages, describe the stages of creating an engine and its elements using 3D-printing. In addition, examples of the use of additive technologies in practice are given.

Additive technologies are a method of creating three-dimensional objects, parts or things according to an electronic model by adding material layer by layer: plastic, metal, concrete or photocurable resin. Such three-dimensional or 3D-objects are created using 3D-printers [1].

The process of creating models of an engine or its parts on a 3D-printer can be divided into several stages. The first stage is directly the idea of a functioning element. This is followed by the development of a 3D-model in a special program. During printing, the printer reads a 3D-printed file (in STL format) containing three-dimensional model data and applies successive layers of liquid, powdered, paper or sheet material, building a 3D-model from a series of cross sections. These layers are joined or fused together to create an object of a given shape. After smelting the parts, it is necessary to process the material and inspect for defects [2].

The use of additive technologies in the aircraft industry has different advantages and disadvantages.

The advantages of 3D-printers:
− speed of production;
− cost of production;
− product quality;
− copy Accuracy;
− production flexibility;
− availability.

Disadvantages of 3D-printers:
− small size of the camera;
− inaccuracies of detail;
− post-processing;
− strength quality models;
− harmful emissions [3].

There are many examples of using this technology. The first tests of the MGTD-20 aviation gas turbine engine printed on a 3D-printer in Russia took place at the Kazanbash aviation center. It was installed on the A30 drone – a flying laboratory. The drone, equipped with an engine, fulfilled the test program: it rose to 170 meters and passed through the points of the route, reaching a speed of 154 kilometers per hour, and then successfully landed [4].

To sum up, we can state that additive manufacturing is an excellent tool for creating prototypes of various devices, parts, or for completely new models, since it makes it possible to perform complex work efficiently and quickly, thereby significantly reducing the cost of the final product. That allows you to expand the scope of its application.

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