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MODERN METHODS OF ADDITIVE MANUFACTURING OF THREE-DIMENSIONAL OBJECTS BASED ON FUGO TYPE PRINTER

Modern methods of additive manufacturing of three-dimensional objects (for example, stereolithography, 3D printing, etc.) allow the production of high-quality products with high precision, but such methods have significant limitations and drawbacks.

At the moment, there is a need for a system and method to ensure 3D printing with improved part quality and increased printing speed. A team of developers from the USA has patented [1] the Fugo 3D printer based on a centrifuge, which can significantly accelerate the printing of complex parts, their quality, and application conditions. Production based on a centrifuge does not require the influence of gravity, which is an invaluable breakthrough and a bright ray of light for the future of humanity, as it will allow printing any complex parts and tools in space, which until now has not been possible for liquid polymer printing technologies. In addition to eliminating the drawbacks of existing 3D printers and approaches to manufacturing super complex objects, this enables people to simplify printing from metal and other super hard materials greatly. Like other printing systems, this printer requires high-quality and fast software to convert user models into printer instructions. Developing such software for an innovative cylindrical printer is an extremely important task as it directly affects the quality and speed of printing models, which is necessary for many users and entire enterprises.

The basis for future research is the transformation of data about a 3D model into a sequential set of layers for printing on a cylindrical printer, which is interpreted as a set of instructions for the Fugo type printer that are executed using internal

software that controls the main components of the printer. It should be mentioned that this work does not relate to the embedded software of the Fugo printer, which controls microcontrollers and other components. The work involves research aimed at transforming data understandable to the end-user into data understandable to the Fugo type printer.

To determine the format of layer data for the Fugo printer, it is necessary to consider the operation scheme of its main components.

The components of the system that provides additive manufacturing of objects based on a centrifuge are:

- the rotating drum containing a photopolymer material that solidifies when exposed to a light source;
- a photopolymer material is evenly distributed over the product during the movement of the rotating drum;
- the light source module consisting of a set of vertically arranged lasers capable of curing the photopolymer material;
- the set of platform drive elements connected to numerous perforated platforms to control their position inside the rotating drum during operation;
- the photopolymer material delivery system for adding a controlled amount of photopolymer material to the rotating drum.

A more detailed description of the operation of the Fugo type printer is planned to be provided in future publications.

Thus, one of the main tasks of this work is to transform data about 3D models into such a layer format, commonly referred to as "slicing." The only difference in this setting is the need to apply cylindrical slicing instead of planar slicing, as is customary in more well-known liquid photopolymer printing technologies (DLP, LCD, etc.).

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