

## **SCREW EXTRUDER OF THE DEVICE OF THREE-D PRINTING FOR THE MANUFACTURE OF PRODUCTS FROM COMPOSITE MIXTURES**

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**The purpose of the work** is to develop the design of the screw extruder of the 3D printing device, which uses composite mixtures as raw materials and provides an accurate and stable process of polymer extrusion for 3D printing of models.

In the extruder of the three-dimensional printing device, which prints with composite mixtures, a screw was chosen as the working organ. An experimental extruder using a rotating screw was designed and manufactured.

The first stage in its creation was the development of a model in the SolidWorks software environment [1].

Creating a 3D model of a screw extruder for a 3D printing device in the SolidWorks software environment included modeling the main elements: screw; material cylinder; loading hopper; nozzles; heating unit; auger drive mechanism and cooling fans.

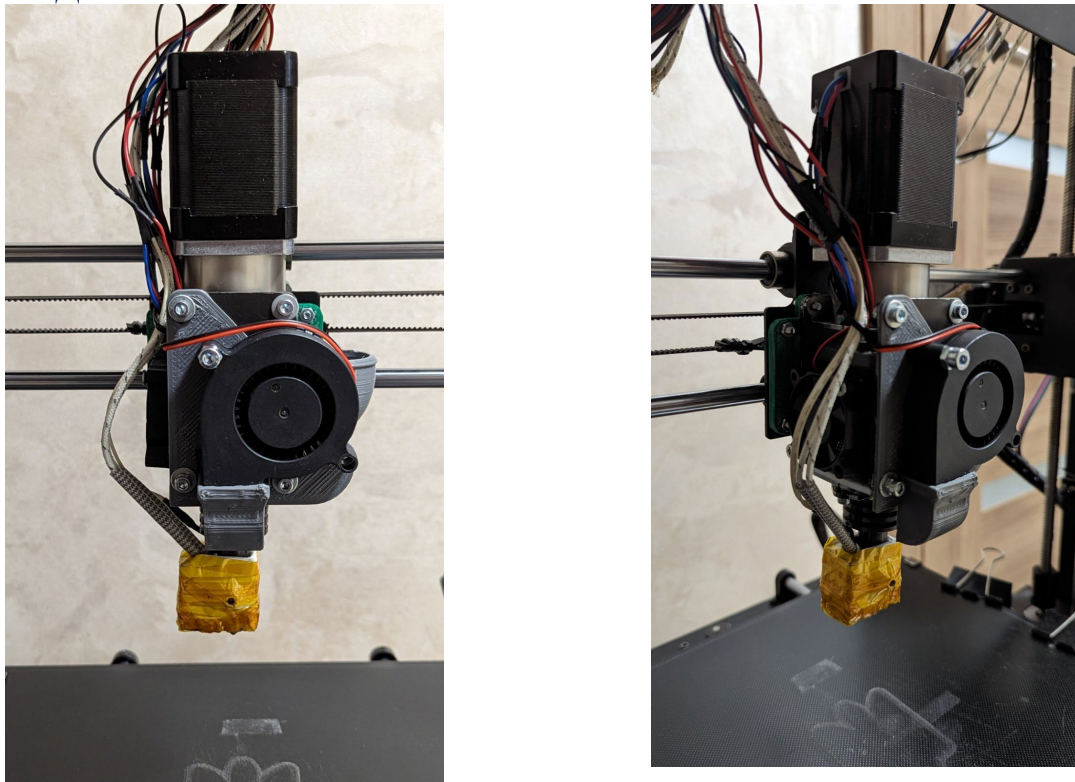
Thus, the creation of a screw extruder model with the help of a software product made it possible to visualize the design, perform various calculations to ensure its efficiency and reliability before manufacturing.

Later, using the received technical documentation and drawings, the design and selection of standard parts, selection of drive elements, heating unit and cooling system were carried out. The general appearance of the screw extruder is presented in Fig. 1.

filament printing extruder on the Anycubic 3D printer Mega S with FMD printing technology from the Chinese company Anycubic [2].

Anycubic Mega S is a large FDM printer with a spacious printing platform, which allows you to create large objects or several smaller objects at the same time. This printer is equipped with a metal construction that ensures stability and printing accuracy, and has a heated printing platform. The presence of heating helps to prevent deformation of products and increases the adhesion of the first layer.

By replacing the standard filament extruder with a screw extruder that prints with composite mixtures, the operation of several key elements of the 3D printer was synchronized.



*Figure 1 – General view of a screw extruder of a 3D printing device for manufacturing products from composite mixtures*

Since the screw extruder works with composite mixtures, and not with filament, the material feed system has been re-engineered to work with them.

**Conclusion.** The developed screw extruder for a 3D printer that prints with composite mixtures is a significant step in the development of additive technologies. This development demonstrates improved print quality due to a stable and uniform supply of material, which is important for obtaining high-quality printed products. Thanks to the developed extruder, the way is opened for further innovations in the field of 3D printing, in particular in the improvement of processing technologies and the use of composite mixtures.

In general, this development is a significant achievement that contributes to the development of additive technologies, ensuring high efficiency, economy and environmental sustainability in production.

#### **R e f e r e n c e**

1. Polishchuk A.O. development 3D printer screw extruder designs that uses granules or chopped particles polymer as outgoing raw materials. Technologies and engineering. 2023. No. 5. P.33-49.
2. i3 Mega S URL: <http://surl.li/nnrpo>. [in Ukraine]