

K. Markin, S. Khomenko

3d-printer development for food materials

Belarusian National Technical University
Minsk, Belarus

3D - the printing or "additive production" – process of creation of integral three-dimensional objects practically of any geometrical form on the basis of digital model. 3D - the printing is based on the concept of creation of object sequentially by the put layers displaying model circuits. Actually, 3D - the printing is the complete antithesis of such traditional methods of mechanical production and processing as milling or cutting where formation of appearance of a product happens due to deleting excess material (so-called "subtractive production") [1].

The 3D technology really impresses. Food 3D-printers whose existence seemed impossible still yesterday became reality today, and it is quite possible that they will be something quite common in the near future. One of the key advantages of the food 3D-printer is an opportunity to create the food adapted to needs of a specific customer i.e. with a variable chemical composition and different biological value, for example, children, athletes, sick and elderly people [2].

The chocolate 3D-printer is the ideal tool for restaurateurs, professional chefs [3]. Also it is simply necessary for the customers wishing to acquire products of "beautiful" decorative forms. 3D printers can print chocolate products of the most different forms from dark, milk or white chocolate by means of normal process of extrusion on the basis of which the existing FDM 3D - printers work. Like other very difficult objects which can't be made without the aid of additive

technologies the printer can create different edible products which can't be made by means of traditional casting [4].

It is necessary to mark that now in Belarus food 3D-printers aren't made. Therefore the development of similar devices is the actual task whose solution is a necessary stage in the course of enhancement of the production technology of confectionery.

We analyzed the existing constructions of 3D-printers. It was found out that for chocolate printing, as a basic model, it is more reasonable to use the RepRap project. In this case FDM is used as printing technology. At this stage, we created the 3D printer on the basis of Prusa Mendel in which the standard extruder is changed and adapted for chocolate printing.



Fig. 1 - Construction of the 3D printer on the basis of Prusa Mendel

Advantages of this construction:

- the simplified build process,
- most of the details can be printed on other 3D printer,
- it is easy in operation,
- big area of printing.

Shortcomings:

- not high accuracy and printing quality,
- vibration when printing,
- low speed of printing.

Soon the pilot studies of the printing head will be made for chocolate printing, and also other pastelike and creamy substances. This will help to establish the optimum, technological parameters of printing allowing to increase quality and speed of printing products in comparison with the existing analogs.

References:

1. Mode of access:

http://3dtoday.ru/wiki/3D_print_technology/. – Date of access: 20.02.2016.

2. Mode of access: http://sitmaster.by/articles/article_post/chto-za-zver-pishchevoy-3d-printer/. – Date of access: 20.02.2016.

3. Mode of access:

<http://3d-expo.ru/ru/11-pishchevyh-3d-printerov-s-kotorymi-v-budushchem-golod-nam-ne-strashen>. – Date of access: 23.02.2016.

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<http://www.3dindustry.ru/article/2962/>. – Date of access: 25.02.2016.