

3D MODELING AS AN ALTERNATIVE METHOD OF THE TASKS SOLUTION AT THE TECHNOLOGY LESSONS

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Abstract

The article deals with the application of 3d modeling and 3d-printing for solving practical-oriented tasks. There is presented a full cycle of production of the part performing the functions as a fastening in a table lamp. The proposed materials are useful in demonstrating the learning opportunities of a modern technology and in practical activities.

Key words: *innovative technologies, 3D-modeling, 3D-printing, new technology lessons at school, solution of the practice-oriented tasks.*

1 INTRODUCTION

In school education, the technology lessons helps students to obtain the knowledge, skills and abilities that contribute to their professional self-determination, and also to solve common and everyday tasks. The preparation of the students for the working life in modern social and economic conditions is achieved through the mastering of modern technologies of mechanized and manual labor, equipment and tools. However, the significant contradiction between the use and the technological processes using information technology becomes aggravated.

The modern world is developing rapidly from the information side and virtual space of 3D-modeling, robotic complexes are in a state of readiness to open new opportunities for solving technical and technological tasks. There was a lot of software that provides easy and fast to create 3D-models. A complex of 3D-modeling and 3D-printing, for example, can be used as an alternative to manual labor for manufacturing parts of various devices. The advantages of 3d technologies are obvious:

1. Speed. The model of a part in the program can be created literally in 5-10 minutes. The printer prints a finished model of small sizes within 1 hour.
2. Economy. To print the product is spent just as much material as necessary, thanks to printing layer by layer. In the traditional work on a machine-tool it is necessary to cut out all the excess from the workpiece.
3. Effective man-hours. The human resource and its time are also an important component. The manual labor is spent a lot of physical and intellectual energy, which exhausts the person. The process of modeling and printing spends human resources cost-effectively. The work itself brings pleasure.

2 Case study

New possibilities of the innovative 3D modeling technologies are undeniable and widely advertised, but, as a rule, on the examples of the products with a conditional practical significance (pictures, toys, decorations, etc.) Taking into consideration the practice oriented focus of the technology lessons, we wanted to find the object of labor, manufacturing which would be a real human life requirement and demonstrate an alternative to the traditional solution of the tasks. We would formulate the problem situation taken from the life as: In Russia, the products which were manufactured in China are widely distributed, they are popular in a certain sense due to their wide functional capabilities and relatively low prices. However, it is often necessary to deal with their insignificant breakdowns of the plastic parts at the first glance, which leads to the impossibility of further the device use. The one family was confronted the problem in which at the current moment they bought the fourth table lamp just because in the first three ones the plastic holders of a fluorescent lamp has been broken (Figure 1) It is necessary to help the family restore the working condition of the table lamps by reproducing the broken down part through 3D-modeling.



Figure 1. Broken part

The Tinkercad web application was selected as the basic software for the solution of the task (Figure 2).

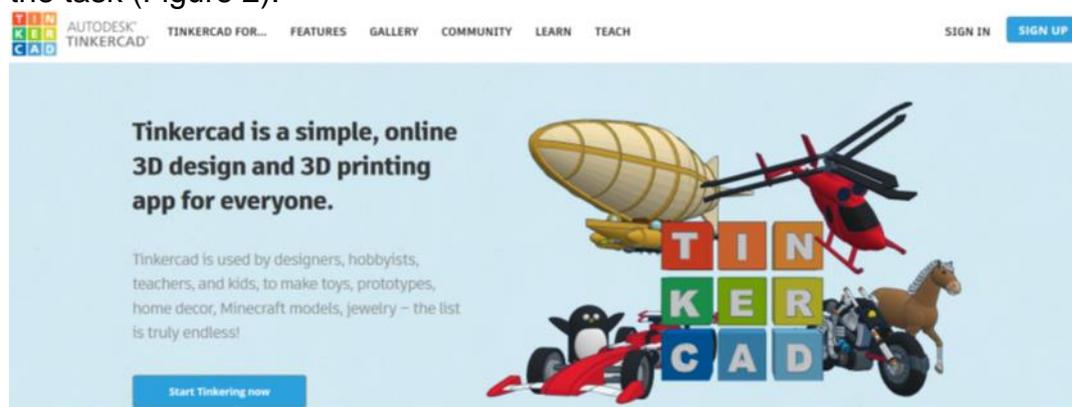


Figure 2. Web-application Tinkercad

To build model parts in a web application, the required dimensions from the sample were measured. Information system for solving tasks is presented in Figure 3.

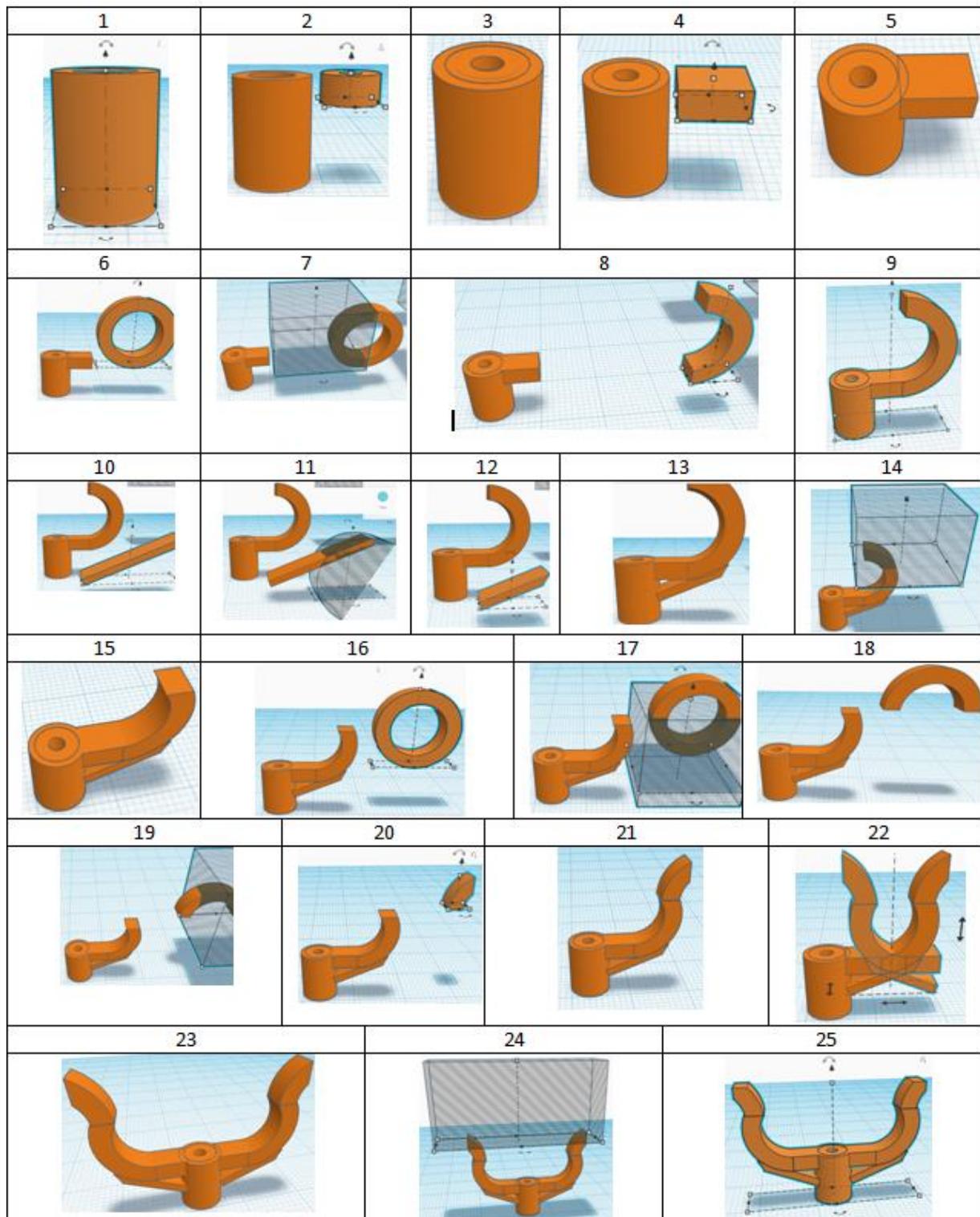


Figure 3 Information system for solving tasks

Take into account the breakdown of the part during operation, we decided to make changes in the design to improve rigidity in a vulnerable location (the stiffeners). After the model was built, the parts were filled with the necessary filling parameters. The 3D printer printed the part (Figure 4).

The part made with the help of 3D-printer has successfully fulfilled its function in the table lamp.



Figure 4. Finished part

3 Conclusion

The considered example of manufacturing a part can be an alternative and effective method for solving practical tasks that can be used by technology teachers in their lessons, with the availability of a material and technical base and knowledge, abilities and skills, especially skills in 3D technologies.

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