

Yaroslav Hovorukha  
V.I.Shevchenko, scientific supervisor  
M.L. Isakova, language adviser  
National TU «Dnipro Polytechnic», Dnipro, Ukraine

## Current State and Perspectives of 3D Printing

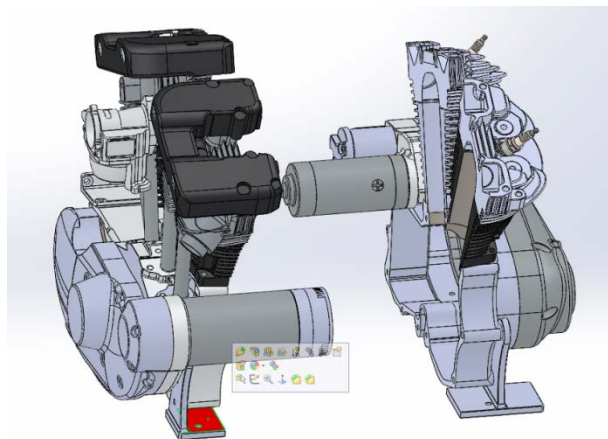
Imagine the situation when you urgently need to buy a chair or table for the kitchen. Now you, most likely, would go to a regular store for this purchase. At best, you would look for the goods on the Internet. But it's not long before you can get a unique chair or table not only without leaving home, but even without any mediation on the part of the sellers or the delivery service of the store. The main thing is that you have a 3D printer at home.

All this may seem fantastic, however all this is already functioning. This is a reality, which is still used to solve a narrow range of problems. But the mass introduction of technology into everyday life is not far off.

3D graphics is a section of computer graphics that is designed to provide the space-time continuity of the images obtained.

A three-dimensional image differs from a flat one by constructing a geometric projection of a three-dimensional model of a scene on a computer screen using specialized programs.

To obtain a three-dimensional image, the following steps are required: modeling and rendering. Modeling is the creation of a mathematical model of the scene and objects in it. Rendering is construction of the projection in accordance with the chosen physical model.



Modeling

Until recently, 3D-printers were considered to be science fiction, able to reproduce the details of their own design, that is, to reproduce themselves. Now the development of such a machine is being carried out by the RepRap project, at the moment the printer already produces more than half of its own parts. The project is a

development with publicly available developments and all information about the design is distributed under the terms of the GNU General License Public License.

The project is the first in the history of inexpensive self-reproducing (that is, capable of recreating at least a part of itself) of a three-dimensional printer - RepRap is being actively implemented in our days by the English designers of the University of Bath. "The most important feature of RepRap is that from the very beginning it was conceived as a replicating system: a printer that prints itself" (Adrian Bower, one of the RepRap project staff). With a 3D-printer, you can use it to print another 3D-printer.

3D-printing technologies already allow you to "overtake" the digital form, say, "Mercedes", and then, having thrown off its digital model to the other end of the world via the network, so that it can be unsealed there in some quiet Moroccan courtyard of an inconspicuous private house. News headlines such as "the *latest model of* Mercedes *again trickled into torrents*" in the future can become commonplace.

In advanced *robotics*, the dominance of 3D printing is also noticeable, for example the already famous robot AlphaDog is almost one-third assembled from parts printed on such a printer.

3D-factory in New York called *Shapeways*, at the moment is the largest factory of 3D-printing in the world, which is able to produce in less than a day almost any mechanical device (rocket engines, described earlier, are done there). It is the world's largest manufacturer of products "to order".

What will happen to the world further, when the former economy becomes impossible when it becomes possible to freely exchange digital models of things and their exact prototypes, and then to embody them in metal with a single click of a button? Most likely, in some countries this will be prohibited. Hundreds of thousands of people will become independent private producers, while simultaneously becoming autonomous digital consumers.

### **References**

1. J. Lee, B. Ware. Three-dimensional graphics and animation. - 2nd ed. - M.: Williams, 2002. - 640 p.
2. VP Ivanov, AS Batrakov. Three-dimensional computer graphics / Ed. G. M. Polishchuk. - M.: Radio and Communication, 1995. - 224 s
3. <https://superbotanik.net>
4. [www.ru.wikipedia.org](http://www.ru.wikipedia.org)
5. The basics of 3d-printing-for-beginners. 3D-printer, - [Electronic resource: <http://partmaker.ru>]
6. K. Afanasyev, 3D-printers, - [Electronic resource: <http://www.3dnews.ru>]
7. 3D-printing: the third industrial-digital revolution. Part 1, - [Electronic resource: <http://bloggerator.ru>]