In this paper the approach to assessing the comparative power consumptions while cooling the flat surface located in a sealed compartment is being developed. An air flow of axial flow fan and the air flow from the cold zone of the vortex tube are being compared. In the first case, the air supplied to the cooling chamber has a temperature and the power consumed by the fan. In the second case, the air compressed by the compressor and a portion of it having a lower temperature is supplied for cooling. The bases of calculation are given according to the heat transfer coefficient in the boundary layer on a flat plate, which allows establishing a connection between the temperatures of the incoming flow and the wall with the air flow in the boundary layer.

The analysis allowed determining the conditions under which the use of the vortex tube is energetically more favorable than the traditional fan. One such condition is the temperature of the cooled surface have to be less then 40° C.

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3D PRINTING IN MEDICINE

Innovation in medicine is of great importance . Ancient doctors used bone saws, suction cups, knives as a medical instruments. Nowadays, medicine has been transformed by new inventions. The precision of surgical robots lets doctors perform previously impossible procedures. Exoskeletons let paralyzed people, stand up and walk again, and smart algorithms help to analyze radiology images. 21 century, is a century of 3D printing boom.

For the first time 3D printing technologies appeared in early 1980's, at that time they were called Rapid Prototyping (RP) information technologies.

3D-printing may seem somewhat mystic, especially when you apply biomedical engineering technology to 3D-printing. In general, 3D-printing involves taking a blueprint, created with software or digital model that is later printed in gradual layers of materials. Hepatocytes, stellate cells and epithelial cells lining the blood vessels are the main material in bio printing.

Bio printing virtually identical to the technology 3D-printing, except that it uses living cells. Conglomerate cells perform bio ink role. The starting model for printing is a three-dimensional model, created in 3D Max.

3D-printing was used in healthcare in the early 2000s. Originally 3D technology was applied like custom prosthetics and dental implant. Since then, the medical tools and applications for 3D-printing have improved greatly. Some

years ago Prosthetic limbs, body parts and granium replacement were made. Dutch surgeons implanted a part of 3D granium on 22 year-old women's skull. As a result her vision has been restored and motor skills has been improved.

Matthew Bramlet has already felt the benefit of 3D-printing in children's Illinois cardiology hospital. There surgeons have done operation, which was conducted for child with heart disease, using 3D-models of his heart.

What was the result? More effective operation. In any case, the model helped surgeons to develop another way to restore the heart of 3-year old boy. Instead of the expected 20-30 years life, he will lead a normal life.

Germany sciences developed the technology for creating a cancer cells. Currently, this technology is not perfect, but maybe in the near future we will understand how create, and destroy this danger mutation cells.

Print nerve cells now also become a reality. A few years ago we believed that it is impossible to restore the nervous system, but now we can do this. Thin work of a small 3D factory can be a magic. Of course, we cannot create a brain, but it is a big progress not only in medicine, it is a big progress in human life.

Intervertebral discs have actively adjusted in 3D-printing technology. The team from Cornell University in the US has successfully completed a series of tests with artificial disc transplants under experimental rats. And now they have already started operations in public. According to specialists recovery, time after such an operation will not take more than 2 weeks. This will reduce time on therapy, which usually takes several months or even years.

Washington State University developed a method which could create material like a bone and today intricate ceramic scaffolds has become a reality. Thousands of people worldwide are waiting for an organ donor. Maybe, in near future, it will be possible to have it in some hours as Organovo organization announced inception of its bio printed liver assays. Agree, it would be grandiose, colossal progress in medicine. There would be no need to wait years in queue, fighting for life.

Another example, using the cells of laboratory rats, a group of professors managed to print microscopic layers of the retina eyes of viable cells. According to them, this technology might be used to treat blindness, replacing damaged cells by healthy ones.

Many experts believe this is a real revolution. Imagine, that in any country there would be a miracle medicine which could treat any illness. You just need to download drawing from the internet, configure the 3D printer properly and that would be solution of your problem. Maybe, one day we will print a man.

Of course, it is difficult to imagine the consequences of such progress. But no doubt the fact, that the numerous positive aspects of 3D-technology in the form of cost-effectiveness, safety and efficiency will allow medicine to break new ground in the struggle for human life.

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